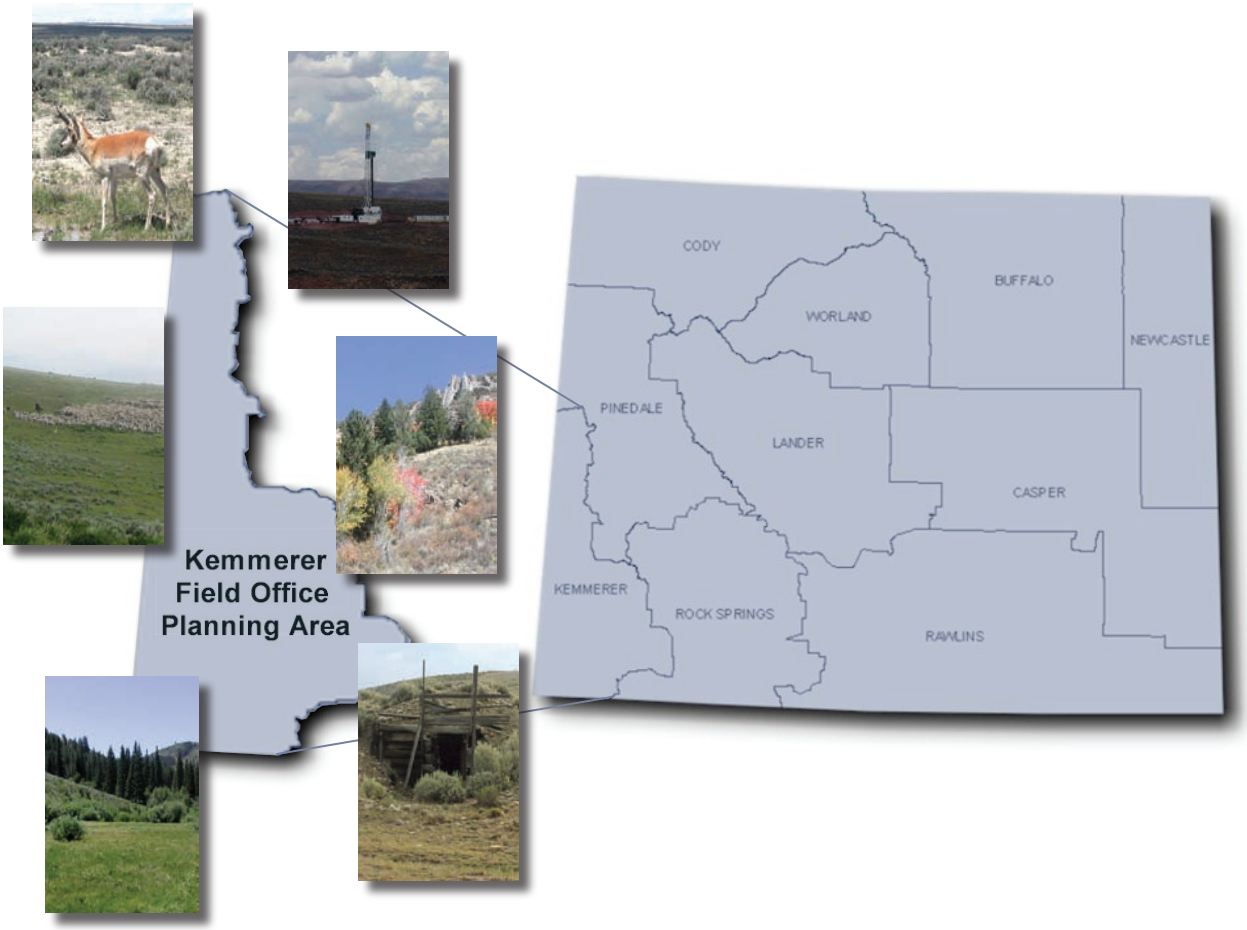
BLM

DRAFT
Resource Management Plan and Environmental Impact Statement for the Kemmerer Field Office Planning Area



Volume 1 of 2
Chapters 1 – 6

Wyoming State Office - Kemmerer Field Office

July 2007

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-07/016+1610

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

TAKE PRIDE IN AMERICA

JUN 1 4 2007

In Reply Refer To:

1793 (930)
1610

Dear Reader:

Attached for your review and comment is the Draft Resource Management Plan and Environmental Impact Statement (Draft RMP/EIS) for the Bureau of Land Management (BLM), Kemmerer Field Office. This document was prepared by the BLM in cooperation with the Bureau of Reclamation, State of Wyoming, county governments, and conservation districts located in the planning area.

The planning area is located in southwest Wyoming and includes approximately 3.9 million acres of land in Lincoln, Sweetwater, and Uinta counties. Within the Kemmerer planning area, the BLM administers approximately 1.4 million acres of public surface and 1.6 million acres of Federal mineral estate. When approved, the RMP will replace the 1986 Kemmerer RMP.

The Draft RMP/EIS describes and analyzes four alternatives for future management of public lands and resources administered by the BLM. While a preferred alternative is identified, selection of the final plan has not been made. The final decision will be made only after consideration of the comments received on the Draft RMP/EIS.

Your review and comment on the content of this document are critical to the success of this planning effort. If you wish to submit comments on the Draft RMP/EIS, we request that you make them as specific as possible. Comments will be more helpful if they include suggested changes, sources or methodologies, and reference to a section or page number. Comments that contain only opinions or preferences will be considered and included as part of the decision making process, although they will not receive a formal response from the BLM. Comments will be accepted for ninety (90) calendar days following the U.S. Environmental Protection Agency's (EPA) publication of its Notice of Availability in the *Federal Register*. The BLM can best utilize your comments and resource information submissions if received within the review period.

Written comments may be submitted as follows:

1. The Kemmerer RMP revision website at www.blm.gov/rmp/kemmerer/ is designed to allow the commenter to submit comments electronically by resource subject directly into a comment form posted on the website. To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format through the website.

2. Comments may be uploaded in an electronic file directly to the above website. Written comments may be mailed directly, or delivered to, the BLM at:

Kemmerer RMP and EIS
Bureau of Land Management Kemmerer Field Office
312 Hwy 189 N
Kemmerer, WY 83101-9711

3. Written comments may be submitted during the public meetings or hearings which will be held at the following locations on the dates listed:

Cokeville	August 6, 2007	Cokeville City Hall 110 Pine Street	Open House 3:00 p.m. to 7:00 p.m.
Kemmerer	August 7, 2007	Lincoln County Library 519 Emerald Street	Public Meeting 3:00 p.m. to 7:00 p.m.
Rock Springs	August 8, 2007	BLM Rock Springs Office 280 Highway 191 North	Public Meeting 3:00 p.m. to 7:00 p.m.
Evanston	August 9, 2007	Uinta County Library 701 Main Street	Public Meeting 3:00 p.m. to 7:00 p.m.
Lyman	August 10, 2007	Lyman Town Hall 100 E Sage Street	Open House 3:00 p.m. to 7:00 p.m.

Comments, including names and street addresses of respondents, will be available for public review in their entirety at the Kemmerer Field Office during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays, and will be published as part of the Proposed RMP and Final EIS. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so. All submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses will be made available for public inspection in their entirety.

Copies of the Draft RMP and EIS have been sent to affected Federal, State, and local government agencies and to those persons who indicated they wished to receive a copy of the Draft RMP and EIS. Copies of the Draft RMP and EIS are available for public inspection at the following BLM locations.

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Bureau of Land Management
Kemmerer Field Office
312 Hwy 189 N
Kemmerer, Wyoming 83101-9711

BLM thanks our cooperating agencies who have participated in the planning process. We look forward to your continued interest and participation.

For additional information or clarification regarding this document or the planning process, please contact Michele Easley, RMP Project Manager at (307) 828-4524.

Sincerely,

for Robert A. Bennett
State Director

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Draft
Resource Management Plan and Environmental Impact Statement for the Kemmerer Field Office Planning Area

Volume 1 of 2
Chapters 1 - 6

U.S. Department of the Interior
Bureau of Land Management
Kemmerer Field Office, Wyoming

July 2007

Kemmerer Field Office Planning Area
Draft Resource Management Plan and Environmental Impact Statement

Lead Agency: U.S. Department of the Interior, Bureau of Land Management

Type of Action: Administrative

Jurisdiction: Lincoln, Sweetwater, and Uinta Counties, Wyoming

Abstract: This Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes alternatives for the planning and management of public lands and resources administered by the Bureau of Land Management (BLM), Kemmerer Field Office. The administrative area is located in southwest Wyoming and includes land in most of Lincoln and Uinta counties, and parts of Sweetwater County. Within the Kemmerer planning area, the BLM manages approximately 1.4-million acres of BLM-administered public land surface and 1.6-million acres of federal mineral estate (refer to Maps 1 through 3 in Volume 2).

The BLM is revising the RMP to address the availability of new data and policies, emerging issues, and changing circumstances that have occurred since the Record of Decision for the existing plan was signed in 1986. As part of the RMP revision process, the BLM performed scoping to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed in the Draft EIS. Planning issues identified for this RMP revision focus on energy and mineral development; vegetation and habitat management; land ownership adjustments; access to public lands; transportation; and special designations.

To assist the agency decisionmaker, cooperating agencies, and the public in focusing on appropriate solutions to planning issues, four alternative RMPs are considered in the Draft EIS. **Alternative A** is a continuation of current management (No Action Alternative). Under this alternative, use of public lands and resources continue to be managed under the 1986 Kemmerer RMP, as amended. **Alternative B** emphasizes conservation of physical, biological, and heritage resources, while providing for the smallest level of development. **Alternative C** emphasizes resource development, while providing for the smallest level of conservation of physical, biological, and heritage resources. **Alternative D** is the BLM's Preferred Alternative at this stage in the process (the Draft RMP/EIS). It is not a final agency decision; it is an indication of the agency's preliminary preference because it reflects the best combination of decisions to achieve BLM goals and policies, meets the purpose and need, addresses the key planning issues, and considers the recommendations of cooperating agencies and BLM specialists.

When completed, the RMP revision will provide a set of comprehensive, long-range decisions for: (1) managing resources throughout the planning area and (2) identifying allowable uses on the public land surface and federal mineral estate administered by the BLM. Comments are accepted for 90 days following the date the U.S. Environmental Protection Agency publishes the Notice of Availability for this Draft EIS in the *Federal Register*. Comments should be submitted via the RMP web site at www.blm.gov/rmp/kemmerer. Alternatively, comments can be faxed to 307-828-4539 or mailed to:

Bureau of Land Management, Kemmerer Field Office
Attn: Michele Easley
312 Hwy 189 N
Kemmerer, Wyoming 83101-9711

Telephone: (307) 828-4524

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
<	less than
>	greater than
§	Section
^oF	degrees Fahrenheit
2-D	two-dimensional
3-D	three-dimensional
ACEC	Area of Critical Environmental Concern
AIRFA	American Indian Religious Freedom Act
AJE	annual job equivalents
AML	abandoned mine land
AMP	Allotment Management Plan
AMR	appropriate management response
APD	application for permit to drill
APHIS	Animal and Plant Health Inspection Service
AQD	Air Quality Division
AQRV	Air Quality-Related Value
AUM	animal unit month
BA	Biological Assessment
BACT	best available control technology
bbls	barrels
Bcf	billion cubic feet
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BMP	Best Management Practice
BTU	British Thermal Units
CAA	Clean Air Act
CASTNet	Clean Air Status & Trends Network
CBNG	coalbed natural gas
CCF	hundred cubic feet
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
COA	conditions of approval
CRMP	Cooperative Resource Management Plan
CSU	controlled surface use
CWA	Clean Water Act
dB	decibel
DEQ	Department of Environmental Quality
DEQAML	Department of Environmental Quality Abandoned Mine Lands
DFC	desired future conditions
DOE	U.S. Department of Energy
DOR	U.S. Department of Revenue
DPS	Distinct Population Segment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FLPMA	Federal Land Policy and Management Act (43 USC § 1701 et seq.)
FY	Fiscal Year
G	Global rank: refers to the range-wide status of a species
GIS	Geographic Information System
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HABS/HAER	Historic American Buildings Survey/Historic American Engineering Record
HMP	Habitat Management Plan
HMRRP	Hazard Management and Resource Restoration Program
I-80	Interstate Highway 80
ID	Interdisciplinary
IM	Instruction Memorandum
IMPLAN	Impact Analysis for Planning model
IMPROVE	Interagency Monitoring of Protected Visual Environments
INNS	Invasive Nonnative Species
KSLA	Known Sodium Leasing Area
lbs	pounds
LAUs	Lynx Analysis Units
LBA	Lease By Application
MA	Management Area
MBF	thousand board feet
MCF	thousand cubic feet
MMB	million barrels
MMBF	million board feet
MMTA	Mechanically Mineable Trona Area
MOU	Memorandum of Understanding
mph	miles per hour
MSA	Management Situation Analysis
msl	mean sea level
MW	megawatts
N	North
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act (42 USC § 4321 et seq.)
NGL	natural gas liquids
NHPA	National Historic Preservation Act
NHT	National Historic Trail
No.	Number
NO_2	nitrogen dioxide
NO_3	nitrate

NOI	Notice of Intent
NO_x	nitrogen oxides
nPA	National Programmatic Agreement
NPS	National Park Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSO	no surface occupancy
NSS	native species status
NWA	National Wilderness Areas
NWR	National Wildlife Refuge
OHV	off-highway vehicle
P&M	Pittsburgh and Midway Coal Mining Company
pH	potential of hydrogen
planning area	Kemmerer Field Office planning area
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POO	plan of operation
PSD	prevention of significant deterioration
Pub. L.	Public Law
R	Range
R&PP	Recreation and Public Purposes (Act)
RFA	Reasonable Foreseeable Action or Activity
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
RNA	Research Natural Area
ROD	Record of Decision
ROW	rights-of-way
SO_2	sulfur dioxide
SO_4	sulfate
SD	Special Designation
Sec.	Section
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act
SO_x	sulfur oxides
SRMA	Special Recreation Management Area
SRP	Special Recreational Permits
SWPPP	Storm Water Pollution Prevention Plan
T	Township
TCP	Traditional Cultural Property
TMA	Travel Management Area
TLS	timing limitation stipulation
UPRR	Union Pacific Railroad
U.S.	United States
USC	United States Code
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VRM	visual resource management
vs.	versus
W	West
WAAQS	Wyoming Ambient Air Quality Standards
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission
WSA	Wilderness Study Area
WSR	Wild and Scenic River
WUI	wildland-urban interface
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System

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EXECUTIVE SUMMARY

INTRODUCTION

This Draft Environmental Impact Statement (EIS) analyzes the proposed action to revise the existing Kemmerer Resource Management Plan (RMP) for the Kemmerer, Wyoming planning area. The Federal Land Policy and Management Act (43 United States Code [USC] § 1701 et seq.) (FLPMA) requires developing, maintaining, and, as appropriate, revising land use plans for public lands. The purpose, or goal, of the land use plan is to ensure lands administered by the Bureau of Land Management (BLM) are managed in accordance with the FLPMA and the principles of multiple use and sustained yield.

Revising an existing land use plan is a major federal action for the BLM. The National Environmental Policy Act (42 USC § 4321 et seq.) (NEPA) of 1969, as amended, requires federal agencies to prepare an EIS for major federal actions; thus, this Draft RMP and EIS is a combined document. The Draft EIS analyzes the impacts of four alternative RMPs for the planning area, including the No Action Alternative and agency Preferred Alternative. The No Action Alternative reflects current management (the existing plan).

PURPOSE AND NEED

Within the Kemmerer planning area, the BLM manages approximately 1.42-million acres of BLM-administered public land surface and 1.6-million acres of federal mineral estate. Since 1986, the existing plan has served as the framework for managing these BLM-administered lands; however, the existing plan has undergone more than 30 maintenance actions, including updates and amendments, and is in need of revision. Since the Record of Decision (ROD) was signed in 1986 for the existing plan, new data have become available, new policies established, and old policies revised. This, along with emerging issues and changing circumstances, resulted in the need for revision. This new version will address the changing needs of the planning area and select a management strategy that best achieves a combination of the following:

- Employing a community-based planning approach and complying with applicable tribal, federal, and state laws, standards, and implementation plans, as well as BLM policies and regulations.
- Establishing goals and objectives (desired outcomes) for managing resources and resource uses according to the principles of multiple use and sustained yield.
- Identifying land use plan decisions to guide future land-management actions and subsequent site-specific implementation decisions.
- Identifying management actions and allowable uses anticipated to achieve the established goals and objectives and reach desired outcomes.
- Providing comprehensive management direction by making land use decisions for all appropriate resources and resource uses administered by the BLM Kemmerer Field Office.
- Recognizing the nation's needs for domestic sources of minerals, food, timber, and fiber, and incorporating requirements of the Energy Policy and Conservation Act Reauthorization, the Energy Policy Act, the National Fire Plan, the Healthy Forest Restoration Act, and the Healthy Forest Initiative.
- Retaining flexibility to adapt to new and emerging issues and opportunities, and providing for adjustments to decisions over time based on new information and monitoring.
- Striving to be compatible with existing plans and policies of adjacent local, state, tribal, and federal agencies and consistent with federal law, regulations, and BLM policy.

- Providing for compliance with applicable tribal, federal, and state laws, standards, implementation plans, and BLM policies and regulations.

PLANNING ISSUES AND CRITERIA

Planning issues identified through the scoping process and other public outreach efforts focus on conflicts among resources and resource uses. Major issues described and analyzed in this Draft EIS include the following:

Energy and Mineral Resources

- What areas are suitable or not suitable for energy and mineral resource development?
- What level of development should be allowed in areas suitable for energy and mineral resource development?

Vegetation and Habitat Management

- How should soil, water, and vegetation be managed to reduce fuel loads and achieve forest health and healthy rangelands while providing for livestock grazing and fish and wildlife habitats?
- How should special status species conservation strategies be applied given the BLM's requirement for multiple-use management and sustained yield? How will these strategies affect other public land resources?

Land Ownership Adjustments, Access, and Transportation

- What land adjustments are necessary to improve access and management of public lands?
- How should travel be managed to provide access for recreation, commercial uses, and general enjoyment of the public lands while protecting cultural and natural resources?

Special Designations

- What areas, if any, contain unique or sensitive resources requiring special management?

Planning criteria are the standards, rules, and guidelines that help direct the RMP planning process. In conjunction with planning issues, planning criteria ensure the planning process is focused and incorporates appropriate analyses. Planning criteria for the Kemmerer RMP revision also apply to development of the final RMP and are summarized below.

- The revised RMP will recognize valid existing rights.
- Decisions in the revised RMP will comply with all applicable laws and regulations. Decisions may comply, as appropriate, with policy and guidance.
- Planning decisions in the revised RMP will cover BLM-administered public lands, including split-estate lands where the subsurface minerals are severed from the surface right. On split-estate lands, the BLM has legal jurisdiction over one or the other (surface land or subsurface minerals).
- The RMP planning effort will be collaborative and multi-jurisdictional in nature. The BLM will strive to ensure that its management decisions are complementary to its planning jurisdictions and adjoining properties within the boundaries described by law and regulation.

- The environmental analysis will consider a reasonable range of alternatives that focus on the relative values of resources and respond to the issues. Management prescriptions will reflect the principles of multiple use and sustained yield.
- The BLM will consider current scientific information, research, new technologies, and the results of resource assessments, monitoring, and coordination to determine appropriate local and regional management strategies to enhance or restore impaired ecosystems.
- The *Standards for Healthy Rangelands and Guidance for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a) will apply to all activities and uses.
- The BLM will provide for public safety and welfare relative to fire, hazardous materials, and abandoned mine lands.
- Visual resource management class designations will be analyzed and modified to reflect present conditions and future needs.
- The BLM will consider current and potential future uses of the public lands through the development of reasonable foreseeable future development and activity scenarios based on historical, existing, and projected levels of use.
- Planning decisions will include the preservation, conservation, and enhancement of cultural, historical, paleontological, and natural components of public land resources, while considering energy development and other activities.
- The BLM will coordinate with tribes to identify sites, areas, and objects important to their cultural and religious heritages.
- Planning decisions will comply with the Endangered Species Act and BLM interagency agreements with the U.S. Fish and Wildlife Service.
- Areas potentially suitable for an Area of Critical Environmental Concern (ACEC) or other special management designations will be identified and, where appropriate, brought forward for analysis in this EIS.
- Waterway segments are classified and determinations of eligibility and suitability will be made in accordance with Section 5(d) of the Wild and Scenic Rivers Act. Appropriate management prescriptions for maintaining or enhancing the outstanding remarkable values and classifications of waterway segments meeting suitability factors will be part of the RMP revision.
- Off-highway vehicle (OHV) use management decisions in the revised RMP will be consistent with the BLM's National OHV Strategy (BLM 2001b).
- A coal lease application—the Haystack Lease by Application—is located in northwestern Uinta County. Coal-screening determinations were made on this area during planning efforts for the Kemmerer RMP (BLM 2004b). No additional coal-screening determinations or coal-planning decisions are anticipated for the Kemmerer Field Office RMP, unless public submissions of coal resource information or surface resource issues indicate a need to update these determinations.

OVERVIEW OF ALTERNATIVES

The BLM conducted a series of four workshops in the Kemmerer Field Office with an Interdisciplinary (ID) Team comprising BLM staff and cooperating agencies. During the initial workshop, the ID Team shared their respective knowledge and expertise and collaborated to identify goals and objectives (desired outcomes) representing a full range of alternatives for each resource. The second workshop narrowed the scope of alternatives to a reasonable range bounded by the planning criteria.

The BLM formulated four action alternatives from the information gathered during the first two workshops; the ID Team reviewed these Action Alternatives during the third workshop. The BLM analyzed the potential impacts of the four action alternatives and the No Action Alternative. Based on this analysis, the similarity among alternatives became apparent and, therefore, the BLM eliminated two of the four action alternatives prior to the fourth workshop. During the fourth workshop, the ID Team considered the No Action Alternative (A) and the two remaining Action Alternatives (B and C) and provided the BLM with recommendations for selecting the Preferred Alternative (D). BLM selected the Preferred Alternative based on the following criteria:

1. Satisfies statutory requirements.
2. Reflects the best combination of decisions to achieve BLM goals and policies.
3. Represents the best solution to the purpose and need.
4. Provides the best approach addressing key planning issues.
5. Considers cooperating agencies and BLM specialists' recommendations.

For approximately 12 months following selection of the Preferred Alternative, the ID Team resolved inconsistencies, clarified intent, and generally refined the alternatives. The Preferred Alternative indicates the Agency's preliminary preference. The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final EIS based on comments received on the Draft EIS, new information, or changes in BLM policies or priorities.

Including the No Action Alternative (A), the four alternatives analyzed in this Draft EIS represent differing approaches to managing resources and resource uses in the planning area. Each alternative comprises two categories of land use planning decisions: (1) desired outcomes (goals and objectives) and (2) allowable uses and management actions.

Goals and objectives provide overarching direction for BLM actions in meeting the Agency's legal, regulatory, policy, and strategic requirements. Goals are broad statements of desired outcome, but generally are unmeasurable. Objectives are more specific statements of a desired outcome that may include a measurable component. Objectives generally are anticipated to achieve the stated goals.

Allowable uses and management actions are anticipated to achieve the desired outcomes (goals and objectives). Management actions are proactive measures or limitations intended to guide BLM activities in the planning area. Allowable uses are a category of land use decisions that identify where specific land uses are allowed, restricted, or prohibited on BLM-administered surface lands and federal mineral estate in the planning area. Alternatives may include specific management actions to meet goals and objectives and may exclude certain land uses to protect resource values.

For each alternative, the BLM predicted actions and associated surface disturbance acreage for each resource over the life of the plan. For example, for livestock grazing, the BLM predicted the number of infrastructure developments (e.g., springs, wells, pits, reservoirs, fences, and pipelines) and estimated surface disturbance acreage for each alternative. For oil and gas, the BLM predicted the number of wells and estimated acres of surface disturbance for each alternative, as well as for the unconstrained (baseline) scenario. These predicted actions, allowable uses, and management actions form the basis for the impact analysis of alternatives described in Chapter 4. The three Action Alternatives and the No Action Alternative are described in detail in Chapter 2 and summarized in the following section.

Alternative A

The No Action Alternative represents a continuation of current management and provides a baseline from which to identify potential environmental consequences when compared to the Action Alternatives. The No Action Alternative describes current resource and land management direction as represented in the

existing plan and associated maintenance actions, updates, and amendments. Current management addresses resource conflicts on a case-by-case basis. The current designation of the Raymond Mountain ACEC and Raymond Mountain Wilderness Study Area (WSA) do not change, and no Other Management Areas (MAs) are identified if the No Action Alternative is selected. Selection of the No Action Alternative results in no revision to the existing plan at this time and does not meet the purpose and need of the proposed action.

Alternative B

Alternative B emphasizes conservation of physical, biological, and heritage resources with the most constraints on resource uses compared to all other alternatives. Relative to all alternatives, Alternative B conserves the most land area for physical, biological, and heritage resources and places the most constraints on resource uses. For example, Alternative B designates the highest number of ACECs (10) and establishes the most land area for Other Management Areas (MAs) (3), Research Natural Areas (RNAs) (2), Wild and Scenic River waterway segments (13), and Back Country Byways (1). Alternative B also manages contiguous blocks of native vegetation to minimize habitat fragmentation, includes the most restrictions to protect highly erosive soils, and is the most restrictive to OHV use, wind-energy development, and leasing for oil and gas and other solid leasable minerals.

Alternative C

Alternative C emphasizes resource uses (e.g., energy and minerals, grazing, recreation, and forest products) while lessening some resource conservation measures to protect physical, biological, and heritage resource values. Compared to all alternatives, Alternative C conserves the least land area for protecting physical, biological, and heritage resource values; designates no ACECs; identifies the smallest area for special management; is the least restrictive to OHV use; places the fewest constraints on resource uses; and allows the most land area for leasing oil and gas and other solid leasable minerals.

Alternative D (Preferred Alternative)

At this stage in the planning process, Alternative D is the BLM's Preferred Alternative because it reflects the best combination of decisions to achieve BLM goals and policies, meet purpose and need, address the major planning issues, and consider the recommendations of cooperating agencies and BLM specialists.

Alternative D emphasizes a moderate level of protection for physical, biological, and heritage resource values and moderate constraints on resource uses. For example, Alternative D retains the Raymond Mountain ACEC and the Raymond Mountain WSA. Alternative D designates the Bridger Butte ACEC, and two additional ACECs, one for special status plant species habitats and one for cushion plant communities, are considered on a case-by-case basis. Alternative D is a balanced approach to land management that the BLM believes best addresses the issues, management concerns, and purpose and need for revising the existing RMP.

In addition to the four alternatives analyzed in this Draft EIS, several alternatives were considered, but were not carried forward for detailed analysis because they

- Did not fulfill requirements of the FLPMA or other existing laws or regulations.
- Did not fulfill the purpose and need.
- Were already part of an existing plan, policy, requirement, or administrative function.
- Did not fall within the limits of the planning criteria.

ENVIRONMENTAL CONSEQUENCES

Environmental consequences potentially resulting from each of the four alternatives were analyzed relative to meaningful direct, indirect, short-term, long-term, and cumulative impacts. The impacts of each alternative are summarized in Table 2-4 and described in more detail in Chapter 4. Also included in Chapter 4 is a discussion of cumulative impacts that could result from the incremental impact of each alternative when added to other past, present, and reasonably foreseeable future actions.

COOPERATING AGENCIES

As the lead federal agency for the RMP revision, the BLM invited local, state, and federal agencies to participate as cooperating agencies. Lincoln, Sweetwater, and Uinta County Commissioners and conservation districts agreed to participate as cooperating agencies in the RMP revision. The State of Wyoming and the U.S. Bureau of Reclamation also are cooperating agencies. To date, the BLM and cooperating agencies have participated in four workshops to formulate alternatives and multiple meetings to keep cooperating agencies informed and to solicit their inputs. Comments from cooperating agencies on previous administrative drafts were considered when developing this Draft EIS.

COORDINATION WITH NATIVE AMERICANS

The BLM also invited tribes to participate as cooperating agencies and conducted ongoing coordination throughout the RMP revision process. Coordination included letters, multiple phone calls, and face-to-face meetings with interested tribe representatives to identify places and issues of concern regarding the RMP revision.

PUBLIC INVOLVEMENT

The BLM issued a Notice of Intent (NOI), on June 16, 2003, indicating a revision of the existing plan and preparation of this EIS. Issuance of the NOI initiated a 5-month scoping period to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed in the Draft EIS. The BLM conducted three individual public scoping meetings in Evanston, Rock Springs, and Kemmerer, Wyoming, during the 5-month scoping period to identify planning issues and introduce the public to the project and preliminary planning criteria. The BLM also established a project website (www.blm.gov/rmp/kemmerer) to keep the public informed about the RMP revision and to provide an ongoing method for public comment.

THE NEXT STEPS

This Draft EIS, now issued, provides 90 days for public comment. A series of two open houses and three individual public hearings on this Draft EIS are scheduled during the 90-day comment period in Cokeville, Kemmerer, Evanston, Rock Springs, and Lyman, Wyoming. Following the 90-day public comment period and consideration of comments received, the BLM will prepare a Final EIS/Proposed RMP in the winter 2007 with a ROD scheduled for 2008.

READER'S GUIDE TO THIS DOCUMENT

Volume 1

Chapter 1. Purpose and Need for Action. This chapter introduces the Draft EIS, describes the purpose and need to which BLM is responding, provides an overview of the BLM planning process, identifies planning issues and criteria, summarizes consultation and coordination, and identifies topics not addressed by this RMP revision.

Chapter 2. Resource Management Alternatives. Chapter 2 describes how the four alternatives (A through D) were developed, the components and content of each alternative, and discusses the alternatives considered but eliminated from further consideration. It also presents a comparative summary of impacts of each alternative. Resource discussions in chapters 2, 3, and 4 are organized according to the following eight resource topics:

Reader's Guide

Volume 1
Chapter 1 – Purpose and Need for Action
Chapter 2 – Resource Management Alternatives
Chapter 3 – Affected Environment
Chapter 4 – Environmental Consequences
Chapter 5 – References
Chapter 6 – List of Preparers

Volume 2
Appendices
Glossary
Maps

1000 Physical Resources – Air, Soil, and Water

2000 Mineral Resources – Locatable, Leasable, and Salable Minerals

3000 Fire and Fuels Management – Unplanned/Wildland Fire, Planned/Prescribed Fire, and Stabilization and Rehabilitation

4000 Biological Resources – Vegetation, Fish and Wildlife, and Special Status Species

5000 Heritage Resources – Cultural, Native American Concerns, and Paleontological

6000 Land Resources – Lands and Realty, Renewable Energy, Rights-of-way and Corridors, Livestock Grazing, Recreation, Travel Management, OHV, Visual, and National Historic Trails

7000 Special Designations – ACECs, MAs, RNAs, Wild and Scenic Rivers, and Back Country Byways

8000 Socioeconomic Resources – Social and Economic Conditions, Health and Safety, and Environmental Justice.

Chapter 3. Affected Environment. This chapter describes the Kemmerer planning area and the existing environmental conditions that could be impacted by the alternatives.

Chapter 4. Environmental Consequences. Chapter 4 forms the scientific and analytic basis for comparing environmental impacts of each alternative, including the No Action Alternative. Impacts are described in terms of direct or indirect and short-term or long-term, when applicable. Potential cumulative and unavoidable impacts and irreversible and irretrievable commitments also are discussed in this chapter.

Chapter 5. References. This chapter provides full citation information for all references cited within the document.

Chapter 6. List of Preparers. Chapter 6 presents the names and qualifications of the people responsible for preparing this EIS.

Volume 2

Appendices. The appendices include documents that support existing resource conditions or situations, substantiate analyses, provide resource management guidance, explain processes, or provide information directly relevant to or support conclusions in the RMP revision. Fifteen appendices, labeled Appendix A to Appendix O, are included.

Glossary. The glossary defines select terms used throughout this document.

Maps. Maps depict the alternatives by resource. In hardcopy documents, maps can be found on a CD attached to the inside back cover of Volume I. For CD versions of the document, maps are provided as a separate file on the CD. Electronic copies of the maps are also available on the RMP website (www.blm.gov/rmp/kemmerer/).

CHAPTER 1
PURPOSE AND NEED FOR ACTION

Roadmap to Chapter 1

A roadmap is provided at the beginning of each chapter. These diagrams are intended to serve as a quick reference guide for the reader.

1.1 Introduction and Background (Page 1-1)

- Historical Overview
- Land Ownership Within the Kemmerer Field Office Planning Area

1.2 Purpose and Need for the Resource Management Plan Revision (Page 1-4)

- Purpose
- Need for Revising the Existing Plan

1.3 Planning Process (Page 1-7)

- Nine-Step Planning Process
- Resource Management Plan Implementation

1.4 Decision Framework (Page 1-9)

- Planning Issues
- Planning Criteria
- Other Related Plans

1.5 Consultation and Coordination (Page 1-13)

- Consultation and Coordination
- Public Involvement

1.6 Topics Not Addressed in This Resource Management Plan Revision (Page 1-22)

1.7 Relevant Statutes, Limitations, and Guidelines (Page 1-22)

- Environmental Policy
- Land Use and Natural Resources Management
- Minerals
- Air Quality
- Water Quality
- Cultural Resources
- Hazardous Materials
- Forest Resources
- Wildlife

CHAPTER 1
PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

This Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes alternatives for the future management of public lands and resources administered by the Bureau of Land Management (BLM), Kemmerer Field Office. The Kemmerer Field Office Planning Area (planning area) is located in southwestern Wyoming and includes approximately 3.9-million acres of land in most of Lincoln and Uinta counties and part of Sweetwater County (Map A). Within the Kemmerer planning area, the BLM manages approximately 1.4-million acres of BLM-administered public land surface and 1.6-million acres of mineral estate. Current management follows the 1986 Kemmerer RMP (existing plan) (BLM 1986a) which has undergone more than 30 maintenance actions.

The Kemmerer Field Office Administrative Acreage

County	BLM Surface	BLM Mineral Estate
Lincoln	834,888	922,700
Uinta	404,785	489,269
Sweetwater	184,143	167,172
Sublette	0	0

Federal mineral estate in Sublette County is generally under Forest Service jurisdiction.

1.1.1 Historical Overview

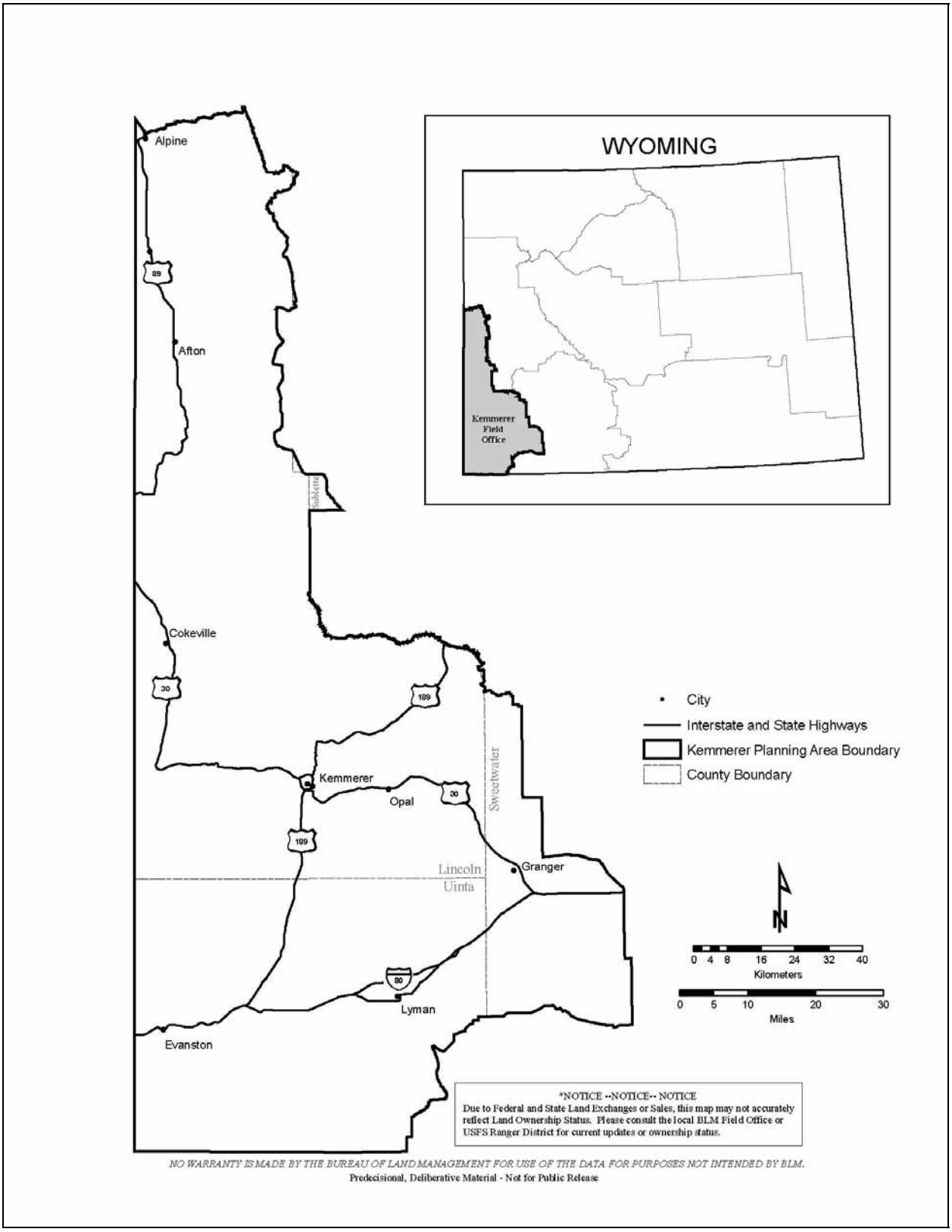
In 1946, the U.S. Grazing Service merged with the General Land Office to form the BLM. The foundation for the BLM dates back to the Land Ordinance of 1785, which established the public domain and led to the creation of the General Land Office. The Northwest Ordinance of 1787 instituted the survey and settlement of lands ceded from the 13 colonies to the federal government and lands later acquired by the government from other countries. While the Nation's westward expansion progressed and the land base expanded, the settlement of western lands was encouraged through the enactment of a variety of laws, including the Homestead acts and the Mining Law of 1872. Over time, the luring of pioneers to settle the west became less necessary and the commercial value of these lands increased. A variety of statutes established to manage mineral, timber, or livestock foraging activities on public lands followed. For example, the Mineral Leasing Act of 1920 allowed leasing, exploration, and production of selected commodities, such as coal, oil, gas, and sodium, on public lands. Another example is the Taylor Grazing Act of 1934, which provided for management of the public rangelands.

After passage of the FLPMA, BLM-administered lands were managed according to the principles of multiple use and sustained yield. Since 1976, the BLM has managed for multiple use and to balance increasing and competing demands for resources on public lands.

1.1.2 Land Ownership Within the Kemmerer Field Office Planning Area

As defined by FLPMA, "… public lands means any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management…." The U.S. Department of the Interior (USDI) BLM Kemmerer Field Office is responsible for managing much of the public land in Lincoln and Uinta counties, and a relatively small acreage in Sweetwater County, Wyoming (refer to Map A).

Map A. Kemmerer Field Office Planning Area



The BLM-administered surface land in the planning area exists in various configurations. Within Lincoln County, large contiguous areas of BLM-administered lands are intermingled with state and private lands. Southeastern Lincoln, most of Uinta, and almost all of the Kemmerer planning area lands in Sweetwater County are affected by the "checkerboard" land ownership pattern. There are no Kemmerer Field Office BLM-administered surface lands in Sublette County. Throughout the planning area, there are also intermingled mineral ownerships, as well as federal minerals under privately owned surface, usually referred to as split-estate land. The scattered surface land pattern and varied mineral ownerships, along with split-estate lands, strongly impact management options. Tables 1-1 and 1-2 contain summaries of the surface and mineral ownership and administrative relationships for the planning area. The BLM leases oil and gas, coal, and trona, and records mining claims on lands administered by other federal agencies. However, the approved RMP will not include planning and management decisions for (1) lands or minerals privately owned or owned by the State of Wyoming or local governments or (2) lands and minerals administered by other federal agencies (see Maps 1 and 2 in Volume 2).

Table 1-1. Acreage of Surface Land Within Each Jurisdiction of the Kemmerer Planning Area

Agency	Lincoln County	Uinta County	Sweetwater County	Sublette County
Bureau of Land Management	834,888	404,785	184,143	0
U.S. Bureau of Reclamation	8,034	0	12,147	0
Department of Defense	0	0	0	0
National Park Service	8,340	0	0	0
State of Wyoming	95,698	51,320	8,093	13
U.S. Fish and Wildlife Service	0	0	1,870	0
U.S. Forest Service	758,965	37,561	80	13,172
Other federal agencies	0	0	0	0
Other (water and private lands)	562,203	742,258	198,718	0
Bankhead Jones Act (USDA)	0	0	0	0

Source: BLM 2006a
Due to the variation in Geographic Information System data layers, values in this table are approximate and not additive.
USDA U.S. Department of Agriculture

Table 1-2. Acreage of Subsurface Mineral Ownership Within Each Jurisdiction of the Kemmerer Planning Area

Agency	Mineral Ownership			
	Lincoln County	Uinta County	Sweetwater County	Sublette County[1]
Bureau of Land Management	922,700	489,269	167,172	0
Other (federal, state, and private)	1,351,585	748,220	238,432	13,187

Source: BLM 2006a
[1]Federal mineral estate in Sublette County occurs under lands managed by the USFS and generally falls under USFS jurisdiction.
Due to the variation in Geographic Information System data layers, values in this table are approximate and not additive.
USFS U.S. Forest Service

1.2 Purpose and Need for the Resource Management Plan Revision

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulation [CFR] 1502.13) require the purpose and need of an EIS to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The purpose and need section of this EIS provides a context and framework for establishing and evaluating the reasonable range of alternatives described in Chapter 2.

1.2.1 Purpose

FLPMA sets forth the policy for periodically projecting the present and future use of public lands and their resources using the land use planning process. Section 1712 of the FLPMA establishes the BLM's land use planning requirements. BLM Handbook H-1601-1, *Land Use Planning Handbook*, provides guidance for implementing the BLM land use planning requirements established by FLPMA and the regulations in 43 CFR 1600 (BLM 2005a).

The purpose, or goal, of the land use plan is to ensure BLM-administered lands are managed in accordance with the FLPMA and the principles of multiple use and sustained yield. The purpose of revising the existing plan is to address the growing needs of the planning area and to select a management strategy that best achieves a combination of the following.

The purpose of the land use plan is to ensure BLM-administered lands are managed in accordance with FLPMA and the principles of multiple use and sustained yield.

- Employ a community-based planning approach to collaborate with federal, state, and local cooperating agencies.
- Establish goals and objectives (desired outcomes) for management of resources and resource uses within the approximately 1.4-million surface acres and 1.6-million acres of federal mineral estate administered by the BLM Kemmerer Field Office in accordance with the principles of multiple use and sustained yield.
- Identify land use plan decisions to guide future land-management actions and subsequent site-specific implementation decisions.
- Identify management actions and allowable uses anticipated to achieve the established goals and objectives and reach desired outcomes.
- Provide comprehensive management direction by making land use decisions for all appropriate resources and resource uses administered by the BLM Kemmerer Field Office.
- Provide for compliance with applicable tribal, federal, and state laws, standards, implementation plans, and BLM policies and regulations.
- Recognize the Nation's needs for domestic sources of minerals, food, timber, and fiber, and incorporate requirements of the Energy Policy Act of 2005 (USC 2005).
- Retain flexibility to adapt to new and emerging issues and opportunities and to provide for adjustments to decisions over time based on new information and monitoring.
- Strive to be compatible with existing plans and policies of overlapping local, state, tribal, and federal agencies and consistent with federal law, regulations, and BLM policy.

1.2.2 Need for Revising the Existing Plan

BLM identified the need, or requirement, to revise the existing plan through a formal evaluation of the existing plan (BLM 2001a), consideration of the Management Situation Analysis (MSA) (BLM 2003a), examination of issues identified during the public scoping process and through collaboration with cooperating local, state, and federal agencies. Since the Record of Decision (ROD) was signed (April 1986) for the existing plan, new data have become available, new laws and regulations have been passed, new policies have been established, and old policies have been revised. This, along with emerging issues and changing circumstances, resulted in the need to revise the existing plan. In addition, the existing plan's decisions no longer serve as a useful guide for resource management in the Kemmerer planning area. For example, the Energy Policy Act of 2005 (USC 2005), coupled with the Nation's growing demand for domestic energy, resulted in different priorities than were foreseen when the existing plan was established in 1986. These and other select examples of new data, new and revised policies, and emerging issues and changing circumstances, demonstrate the need to revise the existing plan.

Specifically, the existing plan's decisions no longer serve as a useful guide for resource management in the Kemmerer planning area; hence, the need to revise the existing plan.

New Data

Monitoring, availability of new information, and advances in science and technology provide new data to consider in the revision of the existing plan. Select new data can be found in the following documents and sources:

- BLM Assessing the Potential for Renewable Energy on Public Lands (BLM 2003b)
- BLM Evaluation of the Kemmerer RMP (BLM 2001a)
- BLM Mineral Occurrence and Development Potential Report (BLM 2004a)
- BLM MSA (BLM 2003a)
- BLM Wyoming Statewide Biological Assessments for Species Regulated by the Endangered Species Act (ESA) published between 2004 and 2005
- Coal Screening Summary Report, Kemmerer Field Office Planning Area (BLM 2004b)
- Cultural Class I Regional Overview (BLM 2004c)
- Energy Policy and Conservation Act (EPCA) Scientific Inventory of Onshore Federal Lands Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development (USDI 2003)
- Final Reasonable Foreseeable Development Scenario for Oil and Gas, Kemmerer Field Office (BLM 2006b)
- Final Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2005b)
- Visual Resource Inventory (BLM 2003h)
- Wyoming Greater Sage-Grouse Conservation Plan (Wyoming Sage Grouse Working Group 2003) and Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004)

New and Revised Laws and Policies

Numerous laws and policies either have been revised or developed since the ROD for the existing plan was signed in 1986. Some of the more important and relevant law and policy changes since 1986 to consider when revising the existing plan include the following:

- BLM National Management Strategy for Motorized Off-Highway Vehicle (OHV) Use on Public Lands (BLM 2001b)
- Umbrella Memorandum of Understanding Between Wyoming Game and Fish Department and U.S. Department of the Interior Bureau of Land Management (Wyoming) for Management of the Fish and Wildlife Resources on the Public Lands (WGFD and BLM 1990)
- BLM Instruction Memoranda (IM), including, but not limited to,
  - Washington Office IM-2002-034 – Guidance on Fire Management, Prescribed Fire, and National Fire Plan (BLM 2002a)
  - Washington Office IM-2002-196 – Additional Guidance on Right-of-Way Management in Land Use Planning (BLM 2002b)
  - Washington Office IM-2003-137 – Integration of the Energy Policy Conservation Act Inventory Results into Land Use Planning and Energy Use Authorizations (BLM 2003d)
  - Washington Office IM-2006-73 – Weed-Free Seed Use on Lands Administered by the Bureau of Land Management (BLM 2006c)
  - Washington Office IM-2005-024 – National Sage-Grouse Habitat Conservation Strategy (BLM 2005c)
- Energy Policy Act of 2005 (USC 2005)
- EPCA Reauthorization of 2000 (EPCA 2000)
- Executive Orders (EOs)
  - EO 13007 (Indian Sacred Sites)
  - EO 13112 (Invasive Species)
  - EO 13175 (Consultation and Coordination with Indian Tribal Governments)
  - EO 13186 (Migratory Birds)
  - EO 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution or Use)
  - EO 13212, as amended by 13302 (Actions to Expedite Energy-Related Projects)
- Handbook H-1601-1, *Land Use Planning Handbook* (BLM 2005a)
- Healthy Forests Restoration Act of 2003 (USC 2003)
- Manual 6840 – Special Status Species (BLM 2001d)
- Manual H-8410-1, BLM Visual Resource Inventory, Section V. Visual Resource Classes and Objectives (BLM 2003e)
- National Fire Plan (USFS 2000)
- Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Onshore Oil and Gas Order Number 1, Approval of Operations (USDI 2007a)
- Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book (BLM and USFS 2006)

- Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act; Final Rule published April 22, 2005, in the *Federal Register* (USDI 2005a)
- *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a)
- Wyoming Weed and Pest Control Act Designated List –Designated Noxious Weeds and Declared List of Weeds and Pests (Wyoming Weed and Pest Council 2005a; 2005b; 2006; 2007)
- Wyoming Weed Management Strategic Plan (Wyoming State Weed Team 2003)

Emerging Issues and Changing Circumstances

Emerging issues and changes in local, regional, and national circumstances to consider when revising the existing plan include the following:

- Increasing and conflicting demands on the planning area's resources and resource uses
- Increasing complexity of resource management issues
- Increasing energy prices and interest in energy (including wind) exploration and development
- Changes in the legal status of plants and wildlife potentially occurring in the planning area
- Growing Wildland-Urban Interface (WUI) areas and fire management
- Changes in the National Historic Trail setting as it relates to adjacent development
- Urbanization of rural areas and the WUI
- Addressing habitat fragmentation given BLM's requirement for multiple use management and sustained yield
- Public access to public lands
- Spreading of invasive nonnative species on public lands
- Increasing use of OHVs on public lands
- Increasing interest in travel management and energy related corridors.

The BLM uses a nine-step planning process when developing and revising RMPs.

1.3 Planning Process

Revision of an existing plan is a major federal action for the BLM. NEPA requires federal agencies to prepare an EIS for major federal actions that significantly affect the quality of the human environment; thus, this EIS accompanies the revision of the existing plan. This EIS analyzes the impacts of four alternative RMPs for the planning area, including the No Action Alternative. The No Action Alternative reflects current management (the existing plan). NEPA requires an analysis of a No Action Alternative.

1.3.1 Nine-Step Planning Process

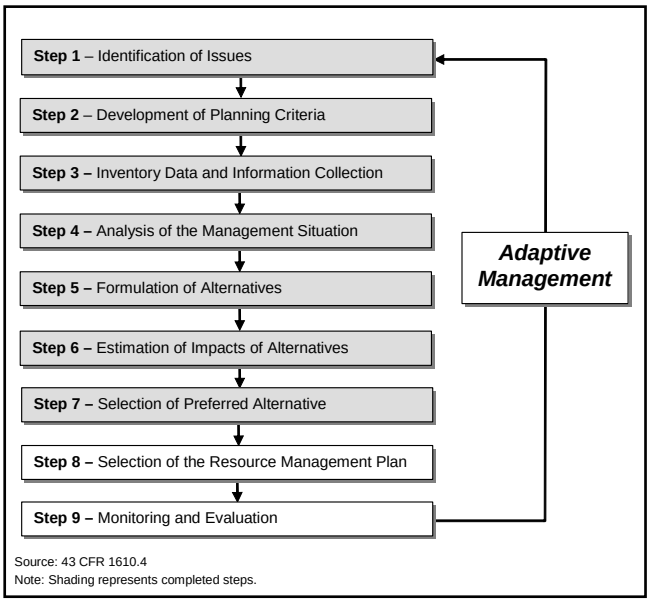
The BLM uses a nine-step planning process (see Figure 1-1) when developing and revising RMPs as required by 43 CFR 1600 and planning program guidance in the BLM Handbook H-1601-1, *Land Use Planning Handbook* (BLM 2005a). BLM manages federal land under Multiple Use, consistent with laws, regulations, and policies governing the administration of public land, in consultation with Native American tribes, coordination with state and local governments, and considering the views of the general public.

As depicted in Figure 1-1, the planning process is issue-driven (Step 1). The BLM utilized the public scoping process to identify planning issues to direct (drive) the revision of the existing plan (see Kemmerer Field Office Final Scoping Report (BLM 2004d). In addition to public involvement, input from the RMP Interdisciplinary (ID) Team provided clarification and refinement of planning issues. The

scoping process was also used to introduce the public to preliminary planning criteria, which set limits to the scope of the RMP revision (Step 2).

As appropriate, the BLM collected data to address planning issues and to fill data gaps identified during public scoping (Step 3). Using these data, the planning issues, and the planning criteria, the BLM conducted an MSA (Step 4) to describe current management and identify management opportunities for addressing the planning issues. Management opportunities identified in the MSA were used to help formulate alternatives to address planning issues. Current management reflects management under the existing plan and management that would continue through selection of the No Action Alternative.

Figure 1-1. Nine-Step Planning Process



Results of the first four steps of the planning process clarified the purpose and need and identified planning issues that need to be addressed by the RMP revision. Planning issues are described in more detail in the Planning Issues section.

During alternative formulation (Step 5), the BLM collaborated with cooperating agencies to identify goals and objectives (desired outcomes) for resources and resource uses in the planning area. These desired outcomes addressed the key planning issues, were constrained by the planning criteria, and incorporated the management opportunities identified by the BLM.

The details of alternatives were developed through the formulation of management actions and allowable uses anticipated to achieve the goals and objectives. The alternatives represent a reasonable range for managing resources and resource uses within the planning area. Chapter 2 of this document describes and summarizes the alternatives.

This EIS also includes an analysis of the impacts of each alternative in Chapter 4 (Step 6). With input from cooperating agencies and BLM specialists, and consideration of planning issues, planning criteria, and the impacts of alternatives, the BLM selected a Preferred Alternative from among alternatives A through C (Step 7). The Preferred Alternative (Alternative D) is the fourth alternative and is analyzed in Chapter 4 of this Draft EIS.

An RMP provides basic program direction with the establishment of goals, objectives, and allowable uses.

Step 8 of the land use planning process will occur following receipt and consideration of public comments on the Draft EIS. Step 9 – Monitoring and Evaluation, occurs when the selected RMP is being implemented.

1.3.2 Resource Management Plan Implementation

After issuing the Approved Plan and ROD, an Implementation Strategy will be developed. The Implementation Strategy will include an annual coordination meeting between BLM and the Cooperating Agencies in the RMP revision. The annual coordination meeting will include an update on

implementation of the plan, foreseeable activities for the upcoming year, and opportunities for continued collaboration with the RMP cooperators. Additional coordination meetings could be held as needed.

Planning and decisionmaking for the management of BLM-administered lands is a tiered, ongoing process. Documents produced during each successive tier are progressively more detailed in terms of their identification of specific measures to be undertaken and impacts that may occur. For example:

- The RMP provides an overall vision of the future (goals and objectives) and includes measurable steps, anticipated management actions, and allowable uses to achieve that vision.
- Upon approval of the RMP, subsequent implementation decisions are carried out by developing activity-level or project-level plans.

At each tier, a more detailed NEPA analysis may occur. In general, a planning-level EIS is prepared at the RMP tier and a more site-specific EIS or Environmental Assessment is prepared at the implementation tier. The activity- or project-level plans will reflect the management direction and vision articulated in the revised RMP. These subsequent plans may require additional public review and environmental compliance documentation. Only the first of these tiers, the RMP, is involved in the present document. As a result, activity- and project-level plans are not considered further in this document.

The RMP provides basic program direction with the establishment of goals, objectives, and allowable uses. The RMP focuses on what resource conditions, uses, and visitor experiences should be achieved and maintained over time. Since this involves considering natural processes with long-term timeframes, the RMP must take a long-term view.

1.4 Decision Framework

As described in the previous section, identifying the planning issues and developing planning criteria are the first steps in defining the scope of the RMP revision. The planning issues and planning criteria provide the framework in which RMP decisions are made. RMP decisions refer to what is established or determined by the final RMP. For example, the BLM received several nominations (issues) for Areas of Critical Environmental Concern (ACECs) during the scoping process for the RMP revision. These issues fall within one of the planning criteria (see Planning Criteria section), the need to identify and analyze areas potentially suitable for ACEC designation. The RMP revision will establish (decide) whether any ACEC will be designated within the planning area. In this example, the land use planning decision is referred to as *special designation*. The RMP provides guidance for land use planning decisions according to the following categories:

- Physical, biological, and heritage resources
- Resource uses and support
- Special designations

In the context of these categories, the planning team develops management strategies aimed at providing viable options for addressing planning issues. The management strategies provide the building blocks from which general management scenarios and, eventually, the more detailed resource management alternatives, are developed. The resource management alternatives reflect a reasonable range of management options that fall within limits set by the planning criteria. The planning issues and planning criteria used to revise the existing plan are described in the following sections.

1.4.1 Planning Issues

The BLM conducted an early and open scoping process to determine the scope of issues to be addressed in this EIS. As part of the scoping process, the BLM solicited comments and issues from the public, organizations, tribal governments, and federal, state, and local agencies, as well as from BLM specialists. The BLM's *Land Use Planning Handbook* defines planning issues as "…disputes or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices" (BLM 2005a). Issues identified during the scoping and RMP revision process for this EIS comprise two categories:

- Issues within the scope of the EIS and used to develop alternatives or otherwise addressed in the EIS.
- Issues outside the scope of the EIS or that could require policy, regulatory, or administrative actions.

Planning issues determined to be within the scope of the EIS are used to develop one or more of the alternatives or are addressed in the analysis section of the EIS. Key planning issues serve as the rationale for alternative development. For this EIS, as planning issues were refined, the BLM collaborated with cooperating agencies to develop a reasonable range of alternatives designed to address and (or) resolve key planning issues. The reasonable range of alternatives provides various scenarios for how the BLM can address key planning issues in the management of resources and resource uses in the planning area. The key planning issues identified for developing alternatives in this EIS are listed below:

Specifically, planning issues help determine the decisions to be made in the RMP and focus the scope of environmental analyses.

Energy and Mineral Resources

- What areas are suitable or not suitable for energy and mineral resource development?
- What level of development should be allowed in areas suitable for energy and mineral resource development?

Vegetation and Habitat Management

- How should soil, water, and vegetation be managed to reduce fuel loads and achieve forest health and healthy rangelands while providing for livestock grazing and fish and wildlife habitat?
- How should special status species conservation strategies be applied given the BLM's requirement for multiple use management and sustained yield? How will these strategies affect other public land resources?

Land Ownership Adjustments, Access, and Transportation

- What land adjustments are necessary to improve access and management of public lands?
- How should travel be managed to provide access for recreation, commercial uses, and general enjoyment of the public lands while protecting cultural and natural resources?

Special Designations

- What areas, if any, contain unique or sensitive resources requiring special management?

In addition to key planning issues, other issues, themes, and positions were identified during the scoping process. Those issues determined to be outside the scope of the EIS or that could require policy,

regulatory, or administrative actions to address were not used to develop alternatives and were not carried forward in this EIS. For example, issues that should be addressed by other agencies or by industry were considered outside the scope of this EIS. Similarly, issues related to the conflicting rights of split-estate could require policy, regulatory, or administrative actions and were not addressed in detail in this EIS.

Items that were considered but not carried forward for detailed study in the EIS because they were outside the scope of the RMP revision, could not be acted upon or did not require action, or because they required the BLM to exceed its authority, are summarized below:

- The BLM should consult, work, and coordinate with or recognize specific organizations, agencies, and (or) authorities.
- The BLM should analyze impacts from specific actions or activities that will occur or be addressed during subsequent RMP implementation decisions.
- The BLM should conduct site-specific analyses, inventories, or surveys, or adopt specific measures or mandates.
- The BLM should adopt or otherwise ensure the RMP revision is compatible with specific plans outside of BLM's authority.
- The BLM should adopt or require site-specific stipulations, resource protection measures, or technologies.

Planning criteria are the standards, rules, and guidelines that help to guide the RMP planning process.

For a detailed description of all issues identified during scoping, please refer to the Kemmerer Field Office Final Scoping Report (BLM 2004d). The scoping report is available on the Kemmerer RMP website at www.blm.gov/rmp/kemmerer/.

1.4.2 Planning Criteria

Planning criteria are the standards, rules, and guidelines that help to guide the RMP planning process. These criteria influence all aspects of the planning process, including inventory and data collection, developing planning issues to be addressed, formulating alternatives, estimating impacts, and selecting the Preferred Alternative. In conjunction with the planning issues, planning criteria ensure that the planning process is focused and incorporates appropriate analyses. Planning criteria are developed from appropriate laws, regulations, and policies. The criteria also help to guide the final plan selection and are used as a basis for evaluating the responsiveness of the planning options.

Planning criteria used in this RMP revision are as follows:

- The revised RMP will recognize valid existing rights.
- Decisions in the revised RMP will comply with all applicable laws and regulations. Decisions will comply, as appropriate, with policy and guidance.
- Planning decisions in the revised RMP will cover BLM-administered public lands, including split-estate lands where the subsurface minerals are severed from the surface right, and the BLM has legal jurisdiction over one or the other.
- The RMP planning effort will be collaborative and multi-jurisdictional in nature. The BLM will strive to ensure that its management decisions are complementary to its planning jurisdictions and adjoining properties within the boundaries described by law and regulation.

- The environmental analysis will consider a reasonable range of alternatives that focus on the relative values of resources and respond to the issues. Management prescriptions will reflect the principles of multiple use and sustained yield.
- The BLM will consider best available scientific information, research, new technologies, and the results of resource assessments, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore impaired ecosystems.
- The *Standards for Healthy Rangelands and Guidance for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* will apply to all activities and uses (BLM 1998a).
- The BLM will provide for public safety and welfare relative to fire, hazardous materials, and abandoned mine lands.
- Visual resource management class designations will be analyzed and modified to reflect present conditions and future needs.
- The BLM will consider current and potential future uses of the public lands through the development of reasonable foreseeable future development and activity scenarios based on historical, existing, and projected levels of use.
- Planning decisions will include the preservation, conservation, and enhancement of cultural, historical, paleontological, and natural components of public land resources, while considering energy development and other activities.
- The BLM will coordinate with tribes to identify sites, areas, and objects important to their cultural and religious heritages.
- Planning decisions will comply with the ESA and BLM interagency agreements with the U.S. Fish and Wildlife Service (USFWS).
- Areas potentially suitable for ACEC or other special management designations will be identified and, where appropriate, brought forward for analysis in the EIS.
- Waterway segments are classified and determinations of eligibility and suitability will be made in accordance with Section 5(d) of the Wild and Scenic Rivers Act. Appropriate management prescriptions for maintaining or enhancing the outstanding remarkable values and classifications of waterway segments meeting suitability factors will be part of the RMP revision.
- OHV use management decisions in the revised RMP will be consistent with the BLM's National OHV Strategy (BLM 2001b).
- A coal lease application, the Haystack Lease by Application, is located in northwestern Uinta County. Coal-screening determinations were made on this area during planning efforts for the Kemmerer RMP (BLM 2004b). No additional coal-screening determinations or coal-planning decisions are anticipated for the Kemmerer Field Office RMP, unless public submissions of coal resource information or surface resource issues indicate a need to update these determinations.

1.4.3 Other Related Plans

BLM planning policies require that the BLM review approved or adopted resource plans of other federal, state, local, and tribal governments and, where practicable, be consistent with those plans. Table 1-3 identifies plans that are related to the management of land and resources that apply to this RMP revision.

Table 1-3. Plans Related to the Management of Land and Resources That Apply to the Kemmerer Resource Management Plan Revision

Related Plans	Related Plans
Lincoln County Comprehensive Plan (Lincoln County Commissioners 2005)	Bridger-Teton National Forest Land and Resource Management Plan (USFS 1990)
Uinta County Comprehensive Plan (Uinta County Commissioners 2004)	Green River Resource Management Plan (BLM 1997a)
Sweetwater County Comprehensive Plan (Sweetwater County Commissioners 2002)	Pinedale Field Office Resource Management Plan (BLM 1988a)
Sweetwater County Conservation District Land and Resource Use Plan and Policy (Sweetwater County Conservation District 2005)	Strategic Habitat Plan (WGFD 2001)
Revised Forest Plan Wasatch-Cache National Forest (USFS 2003)	WGFD Herd Unit Plans (WGFD 2006a, WGFD 2006b)
A Comprehensive Wildlife Conservation Strategy for Wyoming (WGFD 2005)	Programmatic Environmental Impact Statement (EIS) and Plan Amendments for Oil Shale and Tar Sands Resources Leasing on Lands Administered by the BLM in Colorado, Utah, and Wyoming (In Preparation) (USDI 2005b)

WGFD Wyoming Game and Fish Department

In addition, Section 368 of the Energy Policy Act of 2005 (designation of West-wide energy corridors) is being implemented through the current development of an interagency Programmatic EIS. The Final EIS will provide plan amendment decisions that will address numerous energy corridor related issues, including the utilization of existing corridors (enhancements and upgrades), identification of new corridors, supply and demand considerations, and compatibility with other corridor and project planning efforts. It is likely that the identification of corridors in the Final Programmatic EIS will affect the Kemmerer planning area, and the approved Programmatic EIS would subsequently amend the Kemmerer RMP.

1.5 Consultation and Coordination

This section describes specific actions taken by the BLM to consult and coordinate with tribes, government agencies, and interest groups, and to involve the interested general public during preparation of the EIS. A Notice of Intent (NOI) published in the *Federal Register* on June 16, 2003, formally announced the intent of the BLM to revise the existing plan and prepare the associated EIS. Publication of the NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and the public in determining the scope and issues to be addressed by alternatives and analyses in the EIS. Additional detail regarding actions taken by the BLM to involve the public and consult and coordinate with tribes, government agencies, and interest groups is provided in Appendix C.

1.5.1 Consultation and Coordination

This section documents the consultation and coordination efforts undertaken by the BLM throughout the process of revising the RMP and developing the Draft EIS. The FLPMA (43 United States Code [USC] 1712) directs the BLM to coordinate planning efforts with Native American tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process. The BLM is directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 CFR 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through ongoing communications, meetings, and collaborative efforts with the ID Team, which includes BLM specialists and federal, state, and local agencies.

Cooperating Agencies

The Kemmerer Field Office extended cooperating agency status to the State of Wyoming, Lincoln County, Uinta County, Sweetwater County, U.S. Bureau of Reclamation (USBR), various conservation districts, and tribal governments. The BLM invited these entities to participate because they have jurisdiction either by law or by special expertise. A list of the cooperating agencies that have actively participated in cooperators' meetings leading up to the development of the RMP revision and Draft EIS include the following.

Local Governments

- Lincoln County Commissioners
- Lincoln Conservation District
- Uinta County Commissioners
- Uinta Conservation District
- Sweetwater County Commissioners
- Sweetwater County Conservation District

Federal Government

- USDI USBR

State of Wyoming

- State Planning Coordinator's Office
- Department of Agriculture
- State Historic Preservation Office
- Game and Fish Department
- Office of State Lands and Investments
- Department of Environmental Quality

The BLM formally invited the cooperating agencies to participate in developing the alternatives and to provide existing data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process on issues of special expertise or legal jurisdiction. In addition, cooperating agencies participated in a series of alternative formulation workshops, reviewed draft information and documents, and periodically met with BLM management and resource specialists throughout the revision process to discuss planning issues and provide input to the process. Table 1-4 lists these meetings and workshops.

Section 7 Consultation

The Kemmerer Field Office contacted the USFWS regarding Section 7 of the ESA. The BLM sent a letter to the USFWS concerning the Section 7 consultations, presenting the approach for consultation and the process of Programmatic Species-Specific Section 7 Consultations on Wyoming BLM RMPs. The USFWS provided the following species lists to the Kemmerer Field Office for evaluating BLM Section 7 responsibilities:

- List of Endangered, Threatened, and Candidate species for the Bureau of Land Management, Kemmerer Field Office, dated March 17, 2004
- Endangered, Threatened, Proposed and Candidate Species, and Designated Critical Habitat in Wyoming State, dated March 23, 2004

Consultation letters between the USFWS and the Kemmerer Field Office are located in Appendix C. The Kemmerer Field Office will continue consultation with the USFWS through completion of the final biological assessment and final RMP.

Table 1-4. Meetings with Cooperating Agencies

Date	Location	Type of Meeting
January 28, 2004	Kemmerer, Wyoming	Meeting with Shoshone-Bannock Tribes for an Overview of the RMP Process
February 2-6, 2004	Kemmerer, Wyoming	Workshop #1: Alternative Development (All Cooperating Agencies)
February 23-27, 2004	Kemmerer, Wyoming	Workshop #2: Alternative Formulation (All Cooperating Agencies)
April 12, 2004	Kemmerer, Wyoming	Meeting with Shoshone-Bannock Tribes Technical Staff and Business Council
June 29-30, 2004	Kemmerer, Wyoming	Field Manager's Meeting with Shoshone-Bannock and Eastern Shoshone Tribes
December 13-15, 2004	Kemmerer, Wyoming	Workshop #3: Cooperators' Input for the Preferred Alternative (All Cooperating Agencies)
April 20-21, 2005	Kemmerer, Wyoming	Field Manager's Open House Meeting with Cooperators
May 11, 2005	Kemmerer, Wyoming	Cooperating Agency Work Session
September 14-15, 2005	Kemmerer, Wyoming	Workshop #4: Preferred Alternative Formulation (All Cooperating Agencies)
September 26-30, 2005	Kemmerer, Wyoming	Cooperating Agency Work Session
October 31 - November 2, 2006	Kemmerer, Wyoming	Review of comments on Preliminary Draft RMP/EIS Version 1

Native American Interests

Consultation with Native American tribes is part of the NEPA scoping process and a requirement of FLPMA. The Kemmerer Field Office took multiple steps to contact the tribes and include them in the scoping process. On September 12, 2003, the BLM sent letters to the following tribes inviting them to be a part of the planning process through consultation and public scoping meetings, as well as requesting information to be considered in the planning process:

- Eastern Shoshone Tribes
- Northern Arapaho Tribes
- Northern Ute Tribes
- Shoshone-Bannock Tribes

Following the scoping process, the BLM sent a letter to each of the above-listed tribes on November 21, 2003, requesting specific information to identify areas of special concern for the tribes and presenting the opportunity for meetings or field trips with representatives from the tribes. Representatives from the Kemmerer Field Office followed these letters with telephone calls to each tribe. In the letters and during the follow-up telephone calls, the BLM stressed the need for the tribes to review and comment on the Draft EIS.

Representatives of the Kemmerer Field Office met with members of the Shoshone-Bannock tribes several times to solicit input from the tribes concerning the RMP revision. A meeting with Shoshone-Bannock Technical Staff on January 28, 2004, included the BLM giving an overview of the RMP process, a description of land use planning procedures, and a PowerPoint presentation outlining some of the major issues that will be addressed in the RMP. A similar meeting was held on April 12, 2004; however, on this occasion, the BLM presentation was given before a larger group of representatives from the Shoshone-Bannock tribe, representing several technical staff departments and including four of the seven Business Council members. Members of the Shoshone-Bannock and Eastern Shoshone tribes met with representatives from the Kemmerer Field Office on June 29 and 30, 2004, to discuss the RMP revision. The tribes received maps of the general locations of cultural and spiritual interest to the tribes, as well as a tour of the planning area. Native American consultation letters can be found in Appendix C.

1.5.2 Public Involvement

The BLM decisionmaking process is conducted in accordance with the requirements of the CEQ regulations implementing NEPA, and the USDI and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require federal agencies to involve the interested public in their decisionmaking.

In accordance with CEQ scoping guidance, the BLM provided avenues for public involvement as an integral part of revising the RMP and preparing the Draft EIS. CEQ scoping guidance defines scoping as the "process by which lead agencies solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which they will be evaluated" (CEQ 1981). The scoping report, which summarizes issues identified during the scoping process, is available on the Kemmerer RMP website at www.blm.gov/rmp/kemmerer/.

The intent of the scoping process is to provide an opportunity for the public, tribes, other government agencies, and interest groups to scope the planning process and to identify planning issues to be addressed by alternatives or analyzed in the EIS. In general, public involvement assists the agencies through the following.

- Broadening the information base for decisionmaking.
- Informing the public about the Draft EIS and proposed RMP and the potential impacts associated with various management decisions.
- Ensuring that public needs and viewpoints are brought to the attention of the agency.

Scoping Period

Publication of the NOI on June 16, 2003, announced the BLM's intention to revise the Kemmerer RMP and prepare a Draft EIS. Scoping for the RMP revision and Draft EIS took place from June 16, 2003, to November 26, 2003. BLM resource management regulations require a 30-day scoping period; however, the Kemmerer revision scoping period remained open for 5 months.

The BLM utilized the public scoping process to identify planning issues to direct (drive) the formulation of alternatives and to frame the scope of analysis in the EIS. The scoping process also was used to introduce the public to preliminary planning criteria, which set limits to the scope of the RMP revision. Approximately 54 comment letters were received during the scoping period. The scoping report provides a general summary of the issues found in these letters.

Scoping Notice

The BLM prepared a public scoping notice and mailed the notice to 779 federal, state, and local agencies, interest groups, and members of the public on October 27, 2003. In the scoping notice, the BLM solicited

written comments on the RMP revision process, issues, and impacts and invited the public to a series of three public scoping meetings held throughout the planning area. The scoping notice served to remind the public of the opportunity to view the Summary of the MSA, the project schedule, and other relevant project information on the Kemmerer RMP website. In addition, the scoping notice provided general information on the planning area, background information on the planning process, and dates and locations scheduled for the public scoping meetings.

Scoping Meetings

Public scoping meetings were held in Kemmerer, Evanston, and Rock Springs, Wyoming, on November 17, 18, and 19, 2003, respectively (Table 1-5). The BLM structured the meetings in an open-house format, with two formal presentations made by the Kemmerer Field Office Assistant Manager for Resources. Resource specialists and other representatives of the BLM were on hand to personally address questions and provide information to meeting participants. The BLM provided four fact sheets, a summary of the MSA, and a series of four display boards at each scoping meeting. The BLM encouraged attendees to comment using a variety of media, including written comment forms, flip charts, planning area maps, and a computer kiosk.

Table 1-5. Public Involvement, Coordination, and Consultation Meetings (2003)

Date	Location	Type of Meeting
November 17, 2003	Kemmerer, Wyoming	Public Scoping Meeting
November 18, 2003	Evanston, Wyoming	Public Scoping Meeting
November 19, 2003	Rock Springs, Wyoming	Public Scoping Meeting

Opportunities to Comment

The BLM provided a variety of avenues through which the public could comment during the scoping period. These avenues are listed below.

- **Mail** – The NOI and the scoping notice invited interested parties to submit comments by mail to the Kemmerer Field Office.
- **E-mail** – The NOI provided the following e-mail address for submitting comments electronically: krmpwymail@blm.gov.
- **Online** – The Kemmerer RMP revision website at www.blm.gov/rmp/kemmerer/ was launched on November 3, 2003. The website provides history about the project, a project schedule, a document library, a mailing-list screen, and a comment screen. During the comment period, the public could enter their comments on the website and submit them electronically. The capability to submit comments via the website will continue through the 90-day comment period for the Draft EIS.
- **Telephone** – The scoping notice and all four fact sheets provided a phone number so interested parties could call and leave oral comments.
- **In Person at the Scoping Meetings** – The BLM provided the public the opportunity to comment at all three public meetings. Comment methods included a computer kiosk, through which interested individuals could type their comments; comment forms that could be filled out and submitted at the meetings or mailed in at a later date; and flip charts for expressing comments and concerns to share with the BLM and with other members of the public.

Mailing List

The project mailing list for public scoping was initially developed from the Kemmerer Field Office mailing list, but was updated throughout the planning process. The BLM encouraged scoping meeting participants to add their names to the mailing list. Some individuals added their names and addresses to the project mailing list by registering on the project website, as well as through personally contacting the BLM. Currently, the Kemmerer Field Office mailing list includes 845 addresses.

Newsletters

Periodic newsletters have been and are being developed and distributed to keep the public informed of the Kemmerer RMP revision process. The January 2004 newsletter provided basic background information on the project, including the purpose and need for updating the RMP and issues that the plan may address. The newsletter also extended an invitation to the public to be involved in the process, advertised the Kemmerer RMP revision website, and summarized public scoping comments.

A second newsletter (summer 2006) described the development of the alternatives, the process of selecting a preferred alternative, announced the schedule of the Draft EIS, and offered avenues for public involvement. A third newsletter was distributed in June 2007, prior to the release of the Draft EIS, to announce the publication of the Draft EIS and to provide details on how to provide comments.

Website

The Kemmerer RMP revision website is located at www.blm.gov/rmp/kemmerer/. The site serves as a virtual repository for documents related to the development of the RMP revision, including announcements, bulletins, and documents. These documents are available in Adobe Portable Document Format (PDF) to ensure that they are available to the widest range of interested parties. The website gives the public the opportunity to submit their comments for consideration as part of the planning process. The website also offers the public an opportunity to be added to the project mailing list.

Future Public Involvement

Public participation will continue throughout the remainder of the planning process. Members of the public will have the opportunity to comment on the content of the Draft EIS during the specified comment period. The Final EIS will consider all substantive oral and written comments received during the 90-day public comment period. The ROD will be issued by the BLM after the release of the Final EIS, the Governor's Consistency Review, and protest resolution.

Distribution List

A copy of the Draft EIS will be provided to the following governments, individuals, and institutions:

Tribal Governments

- Eastern Shoshone Tribes
- Northern Arapaho Tribes
- Northern Ute Tribes
- Shoshone-Bannock Tribes

Local Governments (Counties, Cities, Towns)

Lincoln County, Wyoming
- Lincoln County Commissioners
- Lincoln County Conservation District

Uinta County, Wyoming
- Uinta County Commissioners
- Uinta County Conservation District

Sweetwater County, Wyoming
- Sweetwater County Commissioners
- Sweetwater County Conservation District

Wyoming State Agencies

- State Historic Preservation Office
- Department of Agriculture
- Department of Environmental Quality
- Game and Fish Department
- Office of State Lands and Investments
- Planning Coordinator's Office
- State Geological Survey

Wyoming State Boards/Commissions

- Air Quality Advisory Board
- Board of Wildlife Commissioners
- Natural Gas Pipeline Authority
- Agriculture Board
- Environmental Quality Council
- Farm Bureau Federation
- Land Quality Advisory Board
- Livestock Board
- Mining Council
- Oil and Gas Conservation Commission
- Recreation Commission
- State Board of Outfitters and Professional Guides
- State Grazing Board
- Trails Council

Associations/Councils

- Coalbed Methane Coordination Coalition
- Mormon Trails Association
- Oregon-California Trails Association
- Petroleum Association of Wyoming
- Powder River Basin Resource Council
- Wildlife Habitat Council
- Wyoming Association of Municipalities
- Wyoming County Commissioners Association
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Outdoor Council
- Wyoming Sportsmen's Association
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Woolgrowers Association
- Independent Petroleum Association of Mountain States

Clubs/Alliances/Societies/Groups

- American Lands Alliance
- Animal Protection Institute of America
- Audubon Society
- Audubon Wyoming
- Biodiversity Conservation Alliance
- Defenders of Wildlife
- Earthjustice
- Environmental Defense
- Foundation for North American Wild Sheep
- Friends of Fort Bridger
- Independent Petroleum Association of Mountain States
- Humane Society of the United States
- Jackson Hole Conservation Alliance
- Medicine Butte Wildlife Association
- Natural Resources Defense Council
- National Trust for Historic Preservation
- National Wildlife Federation
- People for the USA
- People for Wyoming
- Rocky Mountain Elk Foundation
- Sierra Club (Northern Plains and Wyoming Chapters)
- Southwest Wyoming Dirt Riders
- Southwest Wyoming Industrial Association
- Southwest Wyoming Mineral Association
- Sportsmen for Fish and Wildlife – Star Valley
- Sweetwater Wildlife Association
- The Fund for Animals
- The Land and Water Fund of the Rockies
- The Land Trust Alliance
- The Nature Conservancy
- The Mule Deer Foundation (Western and Southwest Wyoming)
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Wyoming Advocates for Animals
- Wyoming Nature Conservancy
- Wyoming Wildlife Federation

Congressional Delegation

- U.S. Senator Mike Enzi
  - Washington, D.C.
  - Jackson, Wyoming
- U.S. Senator Craig Thomas
  - Washington, D.C.
  - Rock Springs, Wyoming
- U.S. Representative Barbara Cubin
  - Washington, D.C.
  - Rock Springs, Wyoming

U.S. Department of the Interior

- Bureau of Indian Affairs
- U.S. Bureau of Reclamation
  - Washington, D.C.
  - Provo, Utah
- Minerals Management Service
- National Park Service
  - Washington, D.C.
  - Denver, Colorado
  - Kemmerer, Wyoming
- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
  - Washington, D.C.
  - Denver, Colorado
  - Cheyenne, Wyoming
- U.S. Geological Survey
  - Washington, D.C.
  - Cheyenne, Wyoming
- Bureau of Land Management
  - Washington, D.C.
  - Wyoming State Office
  - Wyoming Field Offices
    Buffalo, Casper, Cody, Lander, Newcastle, Pinedale, Rawlins, Rock Springs, and Worland

Other Federal Agencies

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture
  Forest Service
  - Big Horn National Forest
  - Bridger-Teton National Forest
  - Medicine Bow/Routt National Forest
  - Shoshone National Forest
- Natural Resources Conservation Service
  - Baggs, Wyoming
- U.S. Army Corps of Engineers
- U.S. Department of Energy
  Western Area Power Administration
  - Loveland and Lakewood, Colorado
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- National Oceanic and Atmospheric Administration's National Weather Service

Libraries

- Library of Congress
- University of Wyoming Library
- Lincoln County Public Library
- Sweetwater County Public Library
- Sublette County Library
- Uinta County Public Library
- Western Wyoming College Library

Educational Institutions

- Eastern Wyoming College
- Western Wyoming Community College
  Archeological Services
- University of Wyoming
  - Trustees
  - Geology Museum
  - Department of Rangeland Ecology
  - Department of Geology and Geophysics

Media

Casper, Wyoming

- Casper Newspapers
  Casper Star Tribune

Evanston, Wyoming

- Evanston Radio
  KOTB/KEVA

Jackson, Wyoming

- Jackson Newspaper
  Jackson Hole News & Guide
- Jackson Radio
  KMTN/KJAX
  KSGT
  KZJH
- Jackson TV
  Cable TV
  KJWY (NBC2)

Kemmerer, Wyoming

- Kemmerer Newspaper
  Kemmerer Gazette
  The Little Chicago Review
- Kemmerer Radio
  KMTN/KJAX
- Kemmerer TV
  KJWY
  KMER/KAOX/KDWY

Pinedale, Wyoming

- Pinedale Newspapers
  Pinedale Roundup
  Sublette Examiner
- Pinedale Radio
  KPIN
  KOTB/KEVA

Riverton, Wyoming

- Riverton Newspaper
  Riverton Ranger
- Riverton Radio
  KVOW/KTAK

Rock Springs, Wyoming

- Rock Springs Newspaper
  Daily Rocket-Miner
- Rock Springs Radio
  KRKK/KSIT/KWSQ
  KYCS

Salt Lake City, Utah

- Salt Lake TV
  KUTB-2 CBS

Statewide Newspapers

- *Silver Star Independent*
- *Green River Star*

Statewide Radio

- University of Wyoming
- KVOW
- KTAK

Uinta, Wyoming

- Uinta Newspaper
  Uinta County Herald

Wire Services

- Cheyenne Associated Press
- Denver Associate Press

1.6 Topics Not Addressed in This Resource Management Plan Revision

Laws, regulations, policies, and EOs require specific resource topics be examined during the NEPA process. In some instances, initial evaluation reveals topics that are not relevant to the planning area or do not require further analysis. Examples of these topics are listed below.

- Prime and Unique Farmlands – Prime or unique farmlands and farmland of statewide or local importance are more common in Midwestern states and not found in western Wyoming. In accordance with the Farmland Protection Policy Act, the local county NRCS determined that no prime or unique farmlands or farmland of statewide or local importance occur on public lands in the planning area (Lewis 2007; Granby 2007). Therefore, impacts on prime and unique farmlands were not analyzed further in this RMP revision.
- Wild Horses and Burros – Herd areas are limited to areas of the public lands identified as being habitat used by wild horses and burros at the time of passage of the 1971 Wild Free-Roaming Horse and Burro Act. No herds or horse areas have been identified in the planning area. Wild horses and burros, therefore, are not discussed in this RMP revision.

1.7 Relevant Statutes, Limitations, and Guidelines

Numerous federal and state laws and applicable regulations, policies, and actions could impact the alternatives analyzed in this EIS. This section describes select authorities that apply to the selection and implementation of alternatives identified in this EIS. This is not an exhaustive list of relevant statutes, limitations, and guidelines; many statutes apply across multiple programs.

1.7.1 Environmental Policy

NEPA requires the preparation of EISs for major federal actions that may significantly affect the human environment. It requires systematic, interdisciplinary planning to ensure the integrated use of natural and social sciences and environmental design when making decisions about major federal actions that could affect the environment. The procedures required under NEPA are implemented through the CEQ regulations at 40 CFR 1500.

An EO regarding federal compliance with pollution control standards (EO 12088) requires that federal agencies comply with applicable pollution control standards. NEPA also requires the BLM to "… promote efforts which will prevent or eliminate damage to the environment …" and to "… attain the widest range of beneficial uses…without degradation, risk to health and safety, or other undesirable and unintended consequences…" (NEPA [42 USC § 4321 et seq.], as amended).

An EO regarding protection and enhancement of environmental quality (EO 11514, as amended by EO 11991) establishes the policy for federal agencies to provide leadership in environmental protection and enhancement.

1.7.2 Land Use and Natural Resources Management

FLPMA provides for public lands to be generally retained in federal ownership for periodic and systematic inventory of the public lands and their resources; for a review of existing withdrawals and classifications; for establishing comprehensive rules and regulations for administering public lands statutes after considering the views of the general public; for adjudication procedures that assure adequate third party participation, objective administrative review of decisions, and expeditious decision making; for multiple-use management on a sustained yield basis; for protection of scientific, scenic, historical,

ecological, environmental, air and atmospheric, water resource, and archeological values; for preservation and protection of certain public lands in their natural condition, where appropriate; for providing food and habitat for fish and wildlife and domestic animals, for providing outdoor recreation and human occupancy and use; for receiving fair market value for the use of the public lands and their resources; for establishing uniform procedures for any disposal, acquisition, or exchange; for protecting ACECs; for recognizing the Nation's need for domestic sources of mineral, food, timber, and fiber from the public lands, including implementing the Mining and Mineral Policy Act of 1970; and for payments to compensate states and local governments for burdens created as a result of the immunity of federal lands from state and local taxation. The general land management regulations are provided in 43 CFR 2000, Subchapter B.

The Taylor Grazing Act of 1934, as amended (43 USC 315), provides authorization to the Secretary of the Interior to establish grazing districts from any part of the public domain of the United States (exclusive of Alaska) which, in the Secretary's opinion, are chiefly valuable for grazing and raising forage crops; could regulate and administer grazing use of all public lands; and could improve the public rangelands. Regulations for grazing permits and leases are provided in 43 CFR 4100.

The Public Rangelands Improvement Act of 1978 (43 USC 1901, et seq.) provides for the improvement of range conditions on public rangelands, research on wild horse and burro population dynamics, and other range management practices.

The Federal Noxious Weed Act of 1974, as amended (7 USC 2814), provides for establishing and funding of an undesirable plant management program, completing and implementing cooperative agreements with state agencies, and establishing integrated management systems to control undesirable plant species.

The Wilderness Act of 1964 (16 USC 1131, et seq.) provides for the designation and preservation of wilderness areas.

EO 11987 (Exotic Organisms), signed May 24, 1977, requires federal agencies, to the extent permitted by law, to restrict the introduction of exotic species into the natural ecosystems on lands and waters owned or leased by the United States; to encourage states, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States; to restrict the importation and introduction of exotic species into any natural ecosystems as a result of activities they undertake, fund, or authorize; and to restrict the use of federal funds, programs, or authorities to export native species for introduction into ecosystems outside the United States where they do not occur naturally.

EO 13112 (Invasive Species), signed on February 3, 1999, prevents the introduction of invasive species and provides for their control, as well as to minimize the economic, ecological, and human health impacts that invasive species cause. Under this EO, federal agencies whose actions may affect the status of invasive species shall (1) identify such actions; (2) use relevant programs and authorities to prevent, control, monitor, and research such species; and (3) not authorize, fund, or carry out actions that are believed to likely cause or promote the introduction or spread of invasive species in the United States or elsewhere.

EO 12548 provides for establishment of appropriate fees for the grazing of domestic livestock on public rangelands and directs that the fees shall not be less than $1.35 per animal unit month.

1.7.3 Minerals

The General Mining Law of 1872, as amended (30 USC 22 (21), et seq.), provides for locating and patenting mining claims where a discovery has been made for locatable minerals on public lands in

specified states. Regulations for staking and maintenance of claims on BLM-administered lands are listed in 43 CFR 3800.

The Mineral Leasing Act of 1920, as amended (30 USC 181, et seq.), provides for the leasing of deposits of coal, phosphate, sodium, potassium, oil, oil shale, gilsonite (including all vein-type solid hydrocarbons), or gas, and lands containing such deposits owned by the United States, including those in national forests, but excluding those acquired under other acts subsequent to February 25, 1920, and those lands within the national petroleum and oil shale reserves. Regulations for onshore oil and gas leasing are provided in 43 CFR 3100.

The Federal Coal Leasing Amendments Act of 1976 requires competitive leasing of coal on public lands and mandates a broad spectrum of coal operations requirements for lease management. Coal leasing regulations for BLM-administered lands are provided in 43 CFR 3400.

The Materials Act of 1947 (30 USC 601 et seq.) authorizes the disposal of vegetative materials, such as timber or other forest products, and mineral materials, such as sand, stone, or gravel, on public lands of the United States. The sales of forest products are governed by the regulations in 43 CFR 5400, while the regulations for the sale and free use of mineral materials are in 43 CFR 3600.

The Energy Policy Act of 2005 was signed into law on August 8, 2005. The act established a comprehensive, long-range energy policy. It provides incentives for traditional energy production, as well as newer, more efficient energy technologies and conservation attempts to combat growing energy challenges. It also provides tax incentives and loan guarantees for energy production of various types.

1.7.4 Air Quality

The Clean Air Act (CAA) of 1990, as amended (42 USC 7401, 7642) established objectives to protect air quality, maintain federal- and state-designated air quality standards, and abide by the requirements of the state implementation plans. The Regional Haze Regulations were developed by the U.S. Environmental Protection Agency (EPA) in response to the CAA Amendments of 1990. They are intended to maintain visibility on the least impaired days and improve visibility on the most impaired days in mandatory Federal Class I areas across the United States, so that visibility in these areas is returned to natural conditions by the year 2064. These regulations require states to submit a regional haze state implementation plan and progress reports to demonstrate reasonable progress toward the 2064 goal. Wyoming Air Quality Standards and Regulations specify the requirements for air permitting and monitoring to implement CAA and state ambient air quality standards.

1.7.5 Water Quality

The Clean Water Act of 1987, as amended (33 USC 1251), established objectives to restore and maintain the chemical, physical, and biological integrity of the Nation's water. The act also requires permits for point source discharges to navigable waters of the United States and the protection of wetlands. It also includes monitoring and research provisions for protection of ambient water quality.

Wyoming Water Quality Regulations implement permitting and monitoring requirements for the National Pollutant Discharge Elimination System, operation of injection wells, storm water permitting, groundwater protection requirements, prevention and response requirements for spills, and salinity standards and criteria for the Colorado River basin.

Protection of Wetlands (EO 11990) requires federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Floodplain Management (EO 11988) provides for the restoration and preservation of national and beneficial floodplain values, as well as enhancement of the natural and beneficial values of wetlands in carrying out programs affecting land use.

1.7.6 Cultural Resources

The Historic Sites Act (16 USC 461 et seq.) declares national policy to identify and preserve historic sites, buildings, and objects, of national significance, thereby providing a foundation for the National Register of Historic Places (NRHP).

The National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.), expands protection of historic and archeological properties to include those of national, state, and local significance. It also directs federal agencies to consider the effects of proposed actions on properties eligible for or included in the NRHP.

The Archaeological Resources Protection Act of 1979, as amended (16 USC 470cc, 470ee), requires permits for the excavation or removal of federally administered archeological resources, encourages increased cooperation among federal agencies and private individuals, provides stringent criminal and civil penalties for violations, and requires federal agencies to identify important resources vulnerable to looting and to develop a tracking system for violations.

The Native American Graves Protection and Repatriation Act of 1990 (32 USC 3001 et seq.) provides a process for federal agencies to return certain Native American cultural items (e.g., human remains, funerary objects, sacred objects, and objects of cultural patrimony) to lineal descendants and culturally affiliated Native American tribes.

The National Trails System Act of 1968, as amended (16 USC 1241 et seq.), establishes a national trails system and provides that federal rights in abandoned railroads may be retained for trail or recreation purposes.

Protection and Enhancement of the Cultural Environment (EO 11593) directs federal agencies to locate, inventory, nominate, and protect federally owned cultural resources eligible for the NRHP and to ensure that their plans and programs contribute to preservation and enhancement of nonfederally owned resources.

The *Programmatic Agreement among the Bureau of Land Management, Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in which BLM will Meet its Responsibilities Under the National Historic Preservation Act* (National Programmatic Agreement [nPA]) expresses how the BLM will meet its responsibilities under Sections 106, 110 and 111 (a) of the National Historic Preservation Act (NHPA) through the implementation of mechanisms agreed to in the nPA. The *State Protocol Between The Wyoming Bureau of Land Management and The Wyoming State Historic Preservation Officer* (Protocol) describes the manner in which the Wyoming State Historic Preservation Officer and the BLM will interact and cooperate under that nPA.

1.7.7 Hazardous Materials

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 USC 9601-9673), provides for liability, risk assessment, compensation, emergency response, and cleanup (including the cleanup of inactive sites) for hazardous substances. The Act requires federal agencies to report sites where hazardous wastes are or have been stored, treated, or disposed, and requires responsible parties to clean up releases of hazardous substances.

The Resource Conservation and Recovery Act, as amended by the Federal Facility Compliance Act of 1992 (42 USC 6901-6992), authorizes the EPA to manage hazardous wastes on active disposal operations. The Act waives sovereign immunity for federal agencies with respect to federal, state, and local solid and hazardous waste laws and regulations. Federal agencies may be subject to civil and administrative penalties for violations and to cost assessments for the administration of enforcement.

The Emergency Planning and Community Right-To-Know Act of 1986 (42 USC 11001-1050) requires the private sector and federal, state, local, and tribal governments to inventory chemicals and chemical products, to report those in excess of threshold planning quantities, to inventory emergency response equipment, to provide annual reports and support to local and state emergency response organizations, and to maintain liaisons with the local and state emergency response organizations and the public.

1.7.8 Forest Resources

The Healthy Forests Restoration Act of 2003 (16 USC 6501 et seq.) contains provisions to expedite and streamline the preparation and implementation of hazardous fuel reduction and forest restoration projects on specific types of at-risk federal lands to increase and improve forest and rangeland health and to prevent the damage caused by catastrophic wildfires.

The Materials Act of 1947 authorizes the disposal of vegetative materials, such as timber or other forest products, and mineral materials, such as sand, stone, or gravel, on public lands of the United States. The sales of forest products are governed by the regulations in 43 CFR 5400, while the regulations for the sale and free use of mineral materials are in 43 CFR 3600.

1.7.9 Wildlife

The ESA of 1973, as amended (16 USC 1531 et seq.), directs federal agencies to ensure that their actions do not jeopardize the continued existence of threatened and endangered species or their critical habitat, and that through their authority they help bring about the recovery of such species.

The Bald Eagle Protection Act of 1940 (16 USC 668), amended in 1962 to include the golden eagle, prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions.

The Fish and Wildlife Coordination Act of 1958 (16 USC 661 et seq.) provides that whenever the waters or channels of a body of water are modified by a department or agency of the United States, the department or agency will first consult with the USFWS and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur, with a view to the conservation of wildlife resources.

The Fish and Wildlife Improvement Act of 1978 (16 USC 742l) authorizes the Secretary of the Interior and the Secretary of Commerce to assist in the training of state fish and wildlife enforcement personnel, to cooperate with other federal or state agencies to enforce fish and wildlife laws, and to use appropriations to pay for rewards and undercover operations.

The Fish and Wildlife Conservation Act of 1980, as amended (16 USC 2901-2912), commonly known as the Nongame Act, recognizing that nongame fish and wildlife possess ecological, educational, aesthetic, cultural, recreational, economic, or scientific value, encourages states to develop conservation plans to restore and maintain fish and wildlife populations. The states may be reimbursed for a percentage of the costs of developing, revising, or implementing conservation plans approved by the Secretary of the Interior. Amendments adopted in 1988 and 1989 also direct the Secretary to undertake certain activities to research and conserve migratory nongame birds.

The Migratory Bird Treaty Act of 1918 (16 USC et seq.) manages and protects migratory bird species through consultation with state and local governments and protection of land and water resources

necessary for the conservation of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.

The Sikes Act of 1960 (16 USC 670a-670o), as amended, Public Law (Pub. L.) 86-797, provides for cooperation by the USDI and the U.S. Department of Defense with state agencies in the planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States. Pub. L. 93-452, signed in 1974, authorized conservation and rehabilitation programs on BLM lands. Pub. L. 97-396, approved in 1982, provided for the inclusion of endangered plants in conservation programs developed for BLM lands. It also distinguished between “cooperative plans” with states and “Cooperative Agreements” under federal law, and clarified section 209 concerning purchases and contracts for property and services from states.

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CHAPTER 2
RESOURCE MANAGEMENT ALTERNATIVES

Roadmap to Chapter 2

This chapter describes how alternatives A through D were developed; their components; other alternatives that were considered, but later eliminated from further consideration; and a comparative summary of impacts for each alternative.

2.1 Alternative Formulation (Page 2-2)

2.2 Alternative Components (Page 2-2)

- Desired Outcomes (Goals and Objectives)
- Allowable Uses and Management Actions
- Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios

2.3 Alternatives Considered, but Not Carried Forward for Detailed Analysis (Page 2-4)

2.4 Alternatives Considered in Detail (Page 2-7)

- Alternative A
- Alternative B
- Alternative C
- Alternative D (Preferred Alternative)

2.5 Details of Alternatives (Page 2-32)

2.6 Summary of Environmental Consequences by Alternative (Page 2-105)

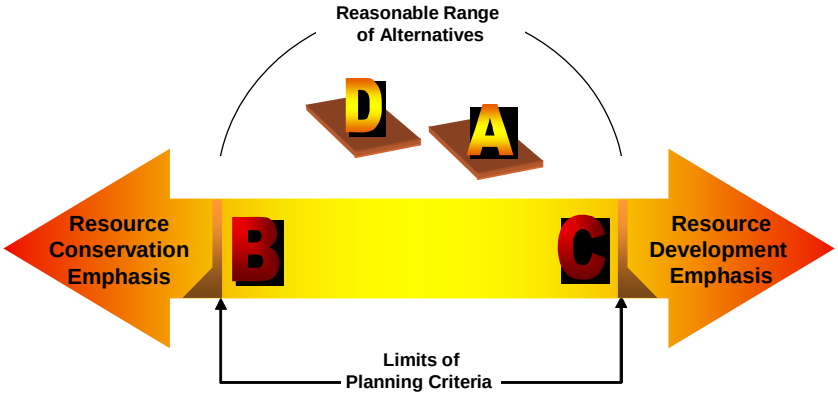
CHAPTER 2
RESOURCE MANAGEMENT ALTERNATIVES

This Environmental Impact Statement (EIS) evaluates four resource management alternatives identified by the letters A, B, C, and D. The No Action (Alternative A) represents the continuation of current management direction. The Bureau of Land Management (BLM) developed the Action Alternatives B and C with input from the public during scoping, cooperating agencies, and BLM resource specialists. Once developed, the BLM analyzed alternatives A through C to predict their impacts on the environment. The BLM used the impacts analysis of alternatives A through C, along with knowledge of specific issues raised throughout the planning process; recommendations from cooperating agencies and BLM resource specialists; consideration of planning criteria; and resolution of resource conflicts to select Alternative D, the Preferred Alternative. Each alternative provides a different emphasis for managing public lands and resources within the Kemmerer Field Office planning area (planning area), and each Action Alternative represents a complete and reasonable land use plan that meets the purpose and need described in Chapter 1.

This EIS evaluates the No Action and three Action Alternatives (four alternatives).

The BLM manages public lands and resource values according to the principles of multiple use and sustained yield. Given these principles and the inherent conflicting nature of resource conservation and resource development, alternative formulation occurs within the limits of planning criteria that address the needs of present and future generations, while remaining flexible for periodic adjustments. This approach results in a reasonable range of alternatives that vary by their emphasis on allowable uses and management actions that affect conservation and development. For example, restrictions on oil and gas development in and around occupied greater sage-grouse leks may exclude or constrain one land use (e.g., oil and gas development) to protect another (e.g., special status species – wildlife). Of course, not all resources and resource uses are mutually exclusive, but rarely do actions beneficial to one resource benefit all the other resources and resource uses that the BLM must manage. The multitude of resources within the planning area coupled with the diversity of planning issues and the requirement to manage for multiple use and sustained yield naturally leads to developing alternatives across a continuous spectrum from resource conservation to resource development. For example, overall, Alternative B places more emphasis on resource conservation, whereas Alternative C places more emphasis on resource development. The remaining alternatives (A and D) fall in between B and C on the continuous spectrum, as shown in Figure 2-1.

Figure 2-1. Reasonable Range of Alternatives for the Kemmerer Planning Area



The BLM formulated each Action Alternative to meet the purpose and need of this Resource Management Plan (RMP) revision. Although the No Action Alternative does not meet the purpose and need for all resources, its inclusion and consideration is required by Council on Environmental Quality regulations. The alternatives differ primarily with respect to their emphases on resource conservation or resource development and the degree to which they address the major planning issues and planning criteria identified in Chapter 1. Action Alternatives or their components (e.g., allowable uses and management actions) that did not fall within the planning criteria, did not meet the purpose and need, or that are already part of an existing plan or administrative function that will continue under the revised RMP were considered, but not carried forward for detailed analysis in this EIS.

2.1 Alternative Formulation

The BLM conducted a series of four workshops in the Kemmerer Field Office with an Interdisciplinary (ID) Team comprising BLM staff and cooperating agencies. During the initial workshop, the ID Team shared their respective knowledge and expertise and collaborated to identify goals and objectives (desired outcomes) representing a full range of alternatives for each resource. The second workshop narrowed the scope of alternatives to a reasonable range bounded by the planning criteria.

The BLM formulated four Action Alternatives from the information gathered during the first two workshops; the ID Team reviewed these Action Alternatives during the third workshop. The BLM analyzed the potential impacts of the four Action Alternatives and the No Action Alternative. Based on this analysis, the similarity among alternatives became apparent and BLM therefore eliminated two of the four Action Alternatives prior to the fourth workshop. During the fourth workshop, the ID Team considered the No Action (A) and the two remaining Action Alternatives (B and C) and provided the BLM with recommendations for selecting the Preferred Alternative (D). BLM selected the Preferred Alternative based on the following criteria.

The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final EIS.

1. Satisfies statutory requirements.
2. Reflects the best combination of decisions to achieve BLM goals and policies.
3. Represents the best solution to the purpose and need.
4. Provides the best approach addressing key planning issues.
5. Considers cooperating agencies and BLM specialists' recommendations.

The Preferred Alternative indicates the agency's preliminary preference. The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final EIS based on comments received on the Draft EIS, new information, or changes in BLM policies or priorities.

2.2 Alternative Components

Alternatives described in this chapter represent approaches to addressing key planning issues (see Chapter 1) and to managing resources and resource uses in the planning area. Each alternative comprises two categories of land use planning decisions: (1) desired outcomes (goals and objectives) and (2) allowable uses and management actions. These two categories, as well as the Reasonable Foreseeable Development (RFD) scenario for oil and gas and Reasonable Foreseeable Actions (RFAs), are discussed below.

2.2.1 Desired Outcomes (Goals and Objectives)

Goals and objectives provide overarching direction for BLM actions in meeting the agency's legal, regulatory, policy, and strategic requirements. Goals and objectives initially were identified during the

first workshop and refined through subsequent collaboration with cooperating agencies. Goals are broad statements of desired outcome, but generally are not measurable. Objectives are more specific statements of a desired outcome that may include a measurable component. Objectives generally are anticipated to achieve the stated goals.

2.2.2 Allowable Uses and Management Actions

Allowable uses and management actions comprise the second category of land use planning decisions and are anticipated to achieve the desired outcomes (goals and objectives). Alternatives were refined to address planning issues, resolve resource conflicts, improve consistency, and ensure resource-specific decisions for the following categories in the RMP revision process: (1) Physical, Biological, and Heritage Resources; (2) Resource Uses and Support; and (3) Special Designations.

> *Management actions are proactive measures or limitations intended to guide BLM activities in the planning area.*

Allowable uses identify where land uses are allowed, restricted, or prohibited on all BLM-administered surface and federal mineral estate in the planning area. Alternatives may include specific land use restrictions to meet goals and objectives and may exclude certain land uses to protect resource values. For example, alternatives considered for this RMP revision prohibit surface occupancy (i.e., no surface occupancy [NSO]) by oil and gas development to protect special status plant species. In addition, because the alternatives may restrict where particular land uses are allowed, restricted, or prohibited, allowable uses often include a spatial (e.g., map) component.

Management actions are proactive measures or limitations intended to guide BLM activities in the planning area. Two types of management actions are included in the alternatives. The first is *management actions common to all alternatives*, which will apply regardless of which action is selected. The second is *management actions by alternative*, which represent the choice(s) considered across alternatives.

The second type of management action, *management actions by alternative*, represents the range of choices considered across alternatives. An example of this type of management action is to restore riparian habitat to address issues of water quality and (or) fish and wildlife habitat. In this example, the acreage or mileage of riparian habitat to restore varies by alternative, whereas the action (restore riparian habitat) is retained for all alternatives.

Although anticipated to achieve desired outcomes, the components described above may not be achieved during the planning period due to limitations in funding or staffing, changing policies or priorities, or new information. These factors also could affect the rate of RMP implementation. It is important to note that the RMP is strategic in nature, and, while it provides an overarching vision for addressing planning issues and managing resources in the planning area, it must also be flexible to changing priorities, information, and circumstances.

2.2.3 Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios

The BLM projected the RFA scenario for each resource program under each alternative (see Appendix M). Using trend data, the RFAs predict actions (and associated surface disturbance acreage) for each resource program. For example, RFAs for the livestock grazing program predict the number of infrastructure developments (e.g., springs, wells, pits, reservoirs, fences, and pipelines) and estimated surface disturbance acreage for each alternative over the life of the plan. For oil and gas, the prediction is referred to as an RFD scenario. Together, allowable uses, management actions, RFAs, and the RFD form the basis for the impact analysis of alternatives described in Chapter 4.

The Energy Policy and Conservation Act (EPCA) Reauthorization of 2000, Public Law 106-469, directed the Secretary of the Interior to conduct an inventory of oil and natural gas resources beneath federal lands. The EPCA also directed the U.S. Department of the Interior (USDI) to identify the extent and nature of any restrictions to resource development. As a result, the USDI, U.S. Department of Agriculture, and the U.S. Department of Energy released the report, *Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development* (referred to as the "EPCA Inventory"), in January 2003. In addition to EPCA, the final RMP will help to address the provisions of the National Energy Policy Act of 2005, including oil and gas development, by identifying areas within the planning area suitable for energy development.

The BLM is integrating the results of the EPCA Inventory into this RMP revision; therefore the EPCA findings are common to all alternatives in this EIS.

The BLM is integrating the results of the EPCA Inventory into this RMP revision; therefore, the EPCA findings are common to all alternatives in this EIS. The oil and gas resource inventory data are integrated into the RFD baseline scenario for oil and gas that predicts future oil and gas exploration and development within the planning area for the unconstrained scenario. Considering land use constraints (e.g., NSO) associated with allowable uses and management actions, expertise, and industry knowledge, the RFD projects the number of wells that might be developed under the constrained scenarios for each alternative (Appendix M). BLM policy requires the RFD baseline scenario be adjusted under each alternative to reflect varying levels of administrative designations, management practices, and mitigation measures (BLM 2004e). Output from the RFD includes the predicted number of wells and associated surface disturbance for the unconstrained (baseline) and alternative scenarios. For example, allowable use restrictions that exclude oil and gas leasing differ by alternative relative to the size of area excluded. The spatial difference in the area excluded, and the underlying mineral development potential, correspond to a difference in the number of wells projected for each alternative. Moreover, because development of each well requires surface disturbance, the acreage of surface disturbance will likewise vary by alternative. The number of wells predicted in the RFD does not equate to a limit on the number of wells or surface disturbance that could occur under each alternative. Rather, the RFD serves as a tool for analyzing the effects discretionary management decisions have on oil and gas activity and provides basic information for analyzing each alternative.

The RMP identifies and documents the constraints on fluid mineral exploration and development in the form of stipulations. Lease stipulations are provisions that modify standard lease rights and are made part of the lease. Oil and gas lease stipulations may be modified or eliminated using the exception, modification, or waiver criteria outlined in Appendix F or through more site-specific environmental analysis. The BLM's authorized officer could modify those stipulations determined to be either too restrictive or too lenient relative to desired outcomes.

2.3 Alternatives Considered, but Not Carried Forward for Detailed Analysis

The alternatives described in this section are actually components of alternatives and were considered, but not carried forward for detailed analysis because (1) they did not fulfill requirements of the Federal Land Policy and Management Act (43 United States Code [USC] § 1701 et seq.) (FLPMA) or other existing laws or regulations; (2) they did not meet the purpose and need as described in Chapter 1; (3) they were already part of an existing plan, policy, or administrative function; or (4) they did not fall within the limits of the planning criteria. A brief description of alternatives considered and the rationale for not carrying forward for detailed analysis are provided below.

- *Suspend existing federal minerals leasing and development operations and cancel existing oil and gas leases.* The BLM must, by law, recognize all valid existing rights.
- *Emphasize the protection of resources by removing most, if not all, human uses.* Management actions including closure or prohibition of various resource uses over portions of the planning area are included in the alternatives.
- *Prohibit or exclude parts or all of the planning area from wind-energy development, oil and gas leasing, all-terrain vehicles/off-highway vehicles (OHV) use, and livestock grazing.* The FLPMA requires the BLM to manage public lands and resources according to the principles of multiple use and sustained yield. Alternatives inconsistent with BLM's multiple use mandate were not carried forward. The BLM recognizes conflicts exist between resources and resource uses and considered these conflicts during development of the alternatives.
- *Adopt or modify policies to favor specific resources or resource uses.* Consideration was given to modifying policies for specific resources and resource uses. In some cases, adopting recommended policies would preclude the flexibility the BLM requires to manage resources or resource uses and did not meet planning criteria. The FLPMA requires the BLM to manage public lands and resources according to the principles of multiple use and sustained yield. Alternatives inconsistent with BLM's multiple use mandate were not carried forward. The BLM recognizes conflicts exist between resources and resource uses, and considered these conflicts during the development of the alternatives.
- *Prohibit surface water disposal of coalbed natural gas (CBNG) wastewater.* The BLM considered this alternative to respond to issues about potential impacts to aquifers, soils, and the quantity and quality of surface water in and downstream of disposal of CBNG-produced water. Under this alternative, all produced water would be captured and re-injected into an underground stratum. The feasibility of an all-re-injection alternative is limited. The BLM could not require industry to implement this alternative since discharge of produced water is under the jurisdiction of the Wyoming Department of Environmental Quality (DEQ), Wyoming State Engineer's Office and (or) the Wyoming Oil and Gas Conservation Commission. In addition, much of the planning area involves nonfederal minerals and nonpublic surface over which the BLM has no jurisdiction. An all-re-injection alternative also would limit the use of CBNG-produced water for beneficial purposes.
- *Initiate land tenure adjustments to protect resources, resource uses, or private property rights*. The BLM is required by law to recognize existing valid rights on public lands and to manage public lands in accordance with existing laws, including, but not limited to, the General Mining Law of 1872 and the Mining and Minerals Policy Act of 1970. Land tenure adjustments within the planning criteria for this RMP revision are included in the alternatives analyzed in detail.
- *Prohibit or require use of specific technology*. Specific technological mitigations are appropriate to project level analysis. Some technologies are not feasible in all locations in the planning area or under all circumstances of a project. Moreover, technologies will evolve over the life of the plan. Blanket technology restriction or requirement limits BLM's flexibility to manage projects based on their unique situation.
- *Conduct cultural resource inventories.* Cultural resource inventories are conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA). Inventories would be required by federal regulation or leasing stipulations in accordance with Section 106 of the NHPA and would continue to be incorporated.
- *Conduct wildlife and special status species surveys and (or) perform conservation measures.* Surveys and conservation measures currently required for wildlife and special status species

according to leasing stipulations, biological opinions, or regulations would continue under all alternatives. New survey or conservation measure requirements would be determined during subsequent site-specific actions and, as appropriate, consultation.

- *Designate or apply special management to specific areas or resources, including Areas of Critical Environmental Concern (ACECs) or Wilderness.* Additional requests for broad designations were received for riparian areas, big game wintering areas, migration and ecological corridors, various wildlife habitat values, threatened and endangered species habitats, archeological sites, National Historic Trails (NHTs), and paleontological sites. The BLM determined that some of the proposed areas overlap and are already protected by existing laws, executive orders (EOs), or policy. Some proposed areas are considered in detail for other management as part of the alternatives. Nominations for the following special designations were received during the planning process:

  Transcontinental Railroad ACEC – Sierra Club: During scoping, the Sierra Club requested that lands along the original transcontinental railroad be designated as an ACEC to protect historic remnants of the line and to educate the public on the importance of the route. The original route of the 1868 railroad crosses approximately 105 miles in the planning area, of which only 22 miles (21%) cross BLM sections. The 22 miles that cross BLM-administered lands are dispersed in small parcels across the 105 miles that the railroad crosses in the planning area. The BLM is extremely limited insofar as management of lands through which the railroad passes; this precludes the ability to manage them as an ACEC because BLM does not control what happens on the other 79 percent of private and state lands. Where the original line exists on public land, cultural resource stipulations and requirements protect the remnant portions.

  Citizen's Proposal Raymond Mountain Wilderness Expansion – Wyoming Wilderness Association: A citizen's proposal was received that requested expansion and inclusion for wilderness consideration of an additional 18,313 acres of mixed BLM/state/private lands adjacent to and east of the current Raymond Mountain Wilderness Study Area (WSA). This area was reviewed in 1984 for the original WSA, but was not considered to be eligible at that time. Since the time of the 1986 RMP, the described lands have undergone additional modern changes and improvements that further remove it from wilderness eligibility. Much of this area also is covered by the Wyoming Game and Fish Department proposed ACECs. The BLM considered the following criteria.

  1. Imprint of man unnoticeable. There are several modern improvements and structures that exist in the proposal area. The most distinctive of these is a modern communications facility with related modern structures, approximately 16 miles of upgraded crowned and ditched roads, and approximately 10 miles of established two-track roads. Other notable improvements and disturbances in the proposal area are barbed-wire fences, fenced exclosures, spring developments, a bridge structure, and several areas where bladed surface disturbance has occurred.
  2. Has outstanding opportunities for solitude or a primitive, unconfined type of recreation. Although there are some portions of the proposed area that may allow for this, there are also many roads in the area that prevent total solitude and prevent truly primitive conditions. To change this condition, closure and reclamation of the roads would be necessary.

3. Has at least 5,000 acres or sufficient size to make practical designation. The suggested area meets this criterion.
4. May also contain ecological, scenic, historic, archeological, and geologically unique qualities. No known special or unique features exist in the requested expansion area. This area is very similar to most of the remaining area outside the current WSA.
5. Is protected and managed to preserve its natural condition. A problem with management may occur due to parcels of state and private lands located within the suggested boundary. BLM has been unsuccessful in exchanging state and private inholdings in the current WSA, although this has been pursued.

2.4 Alternatives Considered in Detail

To reduce the length and avoid confusion, only select meaningful differences (those with the most potential to affect resources) among alternatives are summarized in this section.

This section summarizes the four alternatives (A through D) considered in the Draft EIS. A description of the alternatives considered requires (1) a narrative to describe *what* decisions each alternative will establish and, in some cases, (2) maps to show *where* each decision will occur. With 65 maps and multiple special designations, resource uses, goals, objectives, and management actions for more than 30 individual resources and resource uses, an exhaustive narrative description of each alternative would result in a lengthy and potentially confusing document. To avoid confusion, only select meaningful differences (those with the most potential to affect resources) among alternatives are summarized in this section. Combined with the maps from Volume 2, Table 2-1 and Table 2-2 highlight the meaningful differences among alternatives relative to what they establish and where they occur. Following these tables, a narrative description of each alternative is provided under the following headings.

- Overview of the Alternative
- Physical, Biological, and Heritage Resources
- Resource Uses and Support
- Special Designations

Other than *Overview of the Alternative*, the above headings reflect categories through which program-specific guidance for land use planning decisions must be applied (BLM 2005a). Table 2-1 summarizes meaningful differences among alternatives for the first two categories: Physical, Biological, and Heritage Resources and Resource Uses and Support. Table 2-2 summarizes meaningful differences among alternatives for Special Designations. Viewed in conjunction with the narrative for each alternative, Table 2-1 and Table 2-2 highlight select meaningful decisions each alternative will establish. To avoid redundancy, the narrative descriptions of the Action Alternatives emphasize meaningful differences compared to Alternative A.

The Details of Alternatives section in this chapter and the maps in Volume 2 provide extensive details of each alternative. The Details of Alternatives section describes the goals and objectives for each of eight resource topics (e.g., physical, mineral, biological, etc.). Each alternative under the eight resource topics describes the different allowable uses and management actions as potential decisions under those topics. Goals and objectives (desired outcomes) are not described in the alternative narrative because they do not differ among alternatives.

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Kemmerer Planning Area

(All numbers in this table represent acreage unless otherwise noted.)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Physical, Biological, and Heritage Resources					
Restrictions on Areas of Highly Erosive Soils	BLM-Administered Surface	Comply with standard practices and mitigation guidelines	Prohibit surface disturbance	Apply best management practices	Same as Alternative C
Forestlands/ Woodlands Treated Annually	BLM-Administered Surface	Not identified	50/50	150/100	75/75
Annual Allowable Probable Sale Quantity (CCF/MBF)	BLM-Administered Surface	Must not exceed annual sustainable yield capacity	367/200	1,100/600	550/300
Greater Sage-Grouse Occupied Leks – ¼-mile buffer	BLM-Administered Surface	28,599	28,599	28,599	28,599
	BLM-Administered Mineral Estate	30,442	30,442	30,442	30,442
Greater Sage-Grouse Nesting and Early Brood Rearing Habitats – 2 mile buffer	BLM-Administered Surface	702,360	702,360	702,360	702,360
	BLM-Administered Mineral Estate	745,623	745,623	745,623	745,623
Raptors – ½-mile buffer	BLM-Administered Surface	3,769	0	3,769	0
	BLM-Administered Mineral Estate	3,065	0	3,065	0
Raptors – ¾-mile buffer	BLM-Administered Surface	37,689	0	37,689	37,689
	BLM-Administered Mineral Estate	40,878	0	40,878	40,878
Raptors – 1-mile buffer	BLM-Administered Surface	74,599	0	74,599	74,599
	BLM-Administered Mineral Estate	71,531	0	71,531	71,531
Raptors – 1½-mile buffer	BLM-Administered Surface	0	245,978	0	0
	BLM-Administered Mineral Estate	0	249,154	0	0
Protected Cultural Sites	BLM-Administered Surface	100	132	100	132

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Kemmerer Planning Area *(Continued)*

(All numbers in this table represent acreage unless otherwise noted.)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Resource Uses and Support					
Withdrawn from Locatable Mineral Entry	BLM-Administered Mineral Estate	Existing withdrawals	Existing withdrawals plus 940,220 (includes overlap with existing withdrawals)	Remove existing withdrawals	Existing withdrawals plus 4,572 (includes some overlap)
Cokeville Meadows Proposed Withdrawal from Locatable Mineral Entry	BLM-Administered Mineral Estate	Not identified	3,056 (overlaps the 940,220 acres above)	3,056	3,056 (overlaps with 4,572 acres above)
Administratively Available for Oil and Gas and Other Leasables with Standard Stipulations	BLM-Administered Mineral Estate	261,564	13,796	265,414	64,171
Administratively Available for Oil and Gas and Other Leasables with Moderate Constraints	BLM-Administered Mineral Estate	844,554	103,704	860,249	1,042,502
Administratively Available for Oil and Gas and Other Leasables with Major Constraints	BLM-Administered Mineral Estate	368,427	751,804	348,882	290,973
Administratively Unavailable for Oil and Gas Leasing	BLM-Administered Mineral Estate	104,817	710,058	104,817	181,716
Areas Acceptable for Further Consideration for Coal Leasing	BLM-Administered Mineral Estate	3,963	0	3,963	3,963
Areas of No New Leasing for Other Solid Leasables	BLM-Administered Mineral Estate	32,808	981,110	32,808	32,808
Areas of No New Mineral Material Sales	BLM-Administered Mineral Estate	0	970,953	0	34,374
Lands Identified for Disposal	BLM-Administered Surface	59,508	0	59,508	35,823
Lands Identified for Retention	BLM-Administered Surface	1,364,497	1,424,005	1,364,497	1,388,182
Areas Suitable for Wind-Energy Development	BLM-Administered Surface	Not identified	176,109	1,376,607	780,714

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Kemmerer Planning Area *(Continued)*

(All numbers in this table represent acreage unless otherwise noted.)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Rights-of-Way Exclusion Areas[1]	BLM-Administered Surface	0	452,208	0	109
Pine Creek Canyon SRMA	BLM-Administered Surface	0	4,801	4,801	4,801
Raymond Mountain SRMA	BLM-Administered Surface	0	32,807	32,807	32,807
Oregon-California National Historic Trail SRMA	BLM-Administered Surface	0	63,313	63,313	63,313
Dempsey Ridge SRMA	BLM-Administered Surface	0	33,445	33,445	33,445
Travel Management (Open)	BLM-Administered Surface	0	0	2,791	159
Travel Management (Seasonal Closure)	BLM-Administered Surface	287,160	599,175	0	287,160
Travel Management (Designated)	BLM-Administered Surface	0	0	0	4,506
Travel Management (Closed)	BLM-Administered Surface	32,787	33,896	32,787	33,037
Travel Management Snow Machine Use (Limited)	BLM-Administered Surface	291,653	569,609	0	258,851
Travel Management Snow Machine Use (Closed)	BLM-Administered Surface	26,115	32,802	26,115	32,802
Visual Resource Management - Class I	BLM-Administered Surface	0	32,807	32,807	32,807
	BLM-Administered Mineral Estate	0	32,808	32,808	32,808
Visual Resource Management - Class II	BLM-Administered Surface	129,771	678,733	51,694	427,497
	BLM-Administered Mineral Estate	176,511	814,210	75,515	517,325

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Kemmerer Planning Area *(Continued)*
(All numbers in this table represent acreage unless otherwise noted.)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Visual Resource Management - Class III	BLM-Administered Surface	378,979	383,225	241,728	314,829
	BLM-Administered Mineral Estate	415,026	411,284	261,544	388,269
Visual Resource Management - Class IV	BLM-Administered Surface	878,411	330,939	1,096,917	648,736
	BLM-Administered Mineral Estate	940,765	322,104	1,195,244	639,732
National Historic Trails Viewshed Buffer	BLM-Administered Surface	68,143	168,522	44,152	44,152

[1]This acreage accounts for all types of ROW exclusions, including pipeline and wind energy.
Notes: Restrictions on resource uses (e.g., administratively unavailable for oil and gas leasing) apply to the life of the RMP, but can be

0 No acreage identified under this alternative
BLM Bureau of Land Management
CCF hundred cubic feet
MBF thousand board feet
RMP Resource Management Plan
ROW rights-of-way
SRMA Special Recreation Management Area

Decisions made by this RMP revision are anticipated to be subsequently implemented. Restrictions on resource uses (e.g., areas administratively unavailable for oil and gas leasing) apply to the life of the RMP, unless changed through an RMP amendment and public involvement. The timing and degree of implementation will depend on available budget, staffing, and agency priorities. Actions taken or authorized by the BLM during RMP implementation would comply with standard practices, best management practices (BMPs), and guidelines for surface-disturbing activities (refer to the Glossary). Therefore, these practices and guidelines are considered part of each alternative.

Due to the general strategic nature of alternatives for an RMP revision, site-specific mitigation is not identified in this document. The range of alternatives reflects the degree of mitigation built into each alternative in the form of avoiding, minimizing, and compensating for adverse impacts. During the implementation stage, additional environmental analyses will be conducted, as appropriate, for site-specific actions, and the BLM will determine on a case-by-case basis what, if any, site-specific mitigation is required at that time.

In general, Alternative A focuses more on analyzing proposed activities on a case-by-case basis rather than relying on absolute decisions to manage resources and resource uses in the planning area.

2.4.1 Alternative A

2.4.1.1 Overview of the Alternative

Alternative A (No Action Alternative) represents the continuation of current management of BLM-administered lands in the planning area. Resources and resource uses on lands administered by the BLM within the planning area are currently managed under the existing plan (BLM 1986a), as amended (including currently authorized activity plans [e.g., allotment management plans, habitat management plans]). Existing designations, allowable uses, and management actions for the planning area will continue under Alternative A. In general, Alternative A focuses on analyzing proposed activities on a case-by-case basis to manage resources and resource uses in the planning area.

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Kemmerer Planning Area

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
Raymond Mountain	Bonneville cutthroat trout habitat and riparian areas	Total Surface	ACEC	12,667	ACEC	12,667	No SD	0	ACEC	12,667
		BLM-Administered Surface		12,667		12,667		0		12,667
		BLM-Administered Mineral Estate		12,667		12,667		0		12,667
Raymond Mountain Expansion	Bonneville cutthroat trout habitat	Total Surface	No SD	0	ACEC	33,928	No SD	0	No SD	0
		BLM-Administered Surface		0		27,026		0		0
		BLM-Administered Mineral Estate		0		28,430		0		0
Special Status Plant Species Habitat	SSS populations/ habitat	Total Surface	No SD	0	ACEC/ RNA	907	No SD	0	ACEC CBC	907
		BLM-Administered Surface		0		774		0		774
		BLM-Administered Mineral Estate		0		793		0		793
Cushion Plant Communities	SSS communities	Total Surface	No SD	0	ACEC/ RNA	62	No SD	0	ACEC CBC	62
		BLM-Administered Surface		0		62		0		62
		BLM-Administered Mineral Estate		0		62		0		62
Bridger Butte	Cultural, historical, Native American values, and rare plant species	Total Surface	No SD	0	ACEC	1,127	No SD	0	ACEC	727
		BLM-Administered Surface		0		1,127		0		727
		BLM-Administered Mineral Estate		0		1,127		0		727

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Kemmerer Planning Area *(Continued)*

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
While-tailed Prairie Dog Complexes	White-tailed prairie dog habitat	Total Surface	No SD	0	ACEC	30,913	No SD	0	No SD	0
		BLM-Administered Surface		0		30,913		0		0
		BLM-Administered Mineral Estate		0		28,739		0		0
Dry Fork Watershed	Critical wildlife and fisheries habitats	Total Surface	No SD	0	ACEC	4,690	No SD	0	No SD	0
		BLM-Administered Surface		0		3,172		0		0
		BLM-Administered Mineral Estate		0		4,054		0		0
Upper Tributary Watershed	Critical wildlife and fisheries habitats	Total Surface	No SD	0	ACEC	5,595	No SD	0	No SD	0
		BLM-Administered Surface		0		4,291		0		0
		BLM-Administered Mineral Estate		0		4,924		0		0
Lower Tributary Watershed	Critical wildlife and fisheries habitats	Total Surface	No SD	0	ACEC	1,371	No SD	0	No SD	0
		BLM-Administered Surface		0		1,351		0		0
		BLM-Administered Mineral Estate		0		1,359		0		0
Fossil Basin	Preservation and research of fossil resources	Total Surface	No SD	0	ACEC/ MA	451,452	No SD	0	No SD	0
		BLM-Administered Surface		0		201,660		0		0
		BLM-Administered Mineral Estate		0		250,146		0		0

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Kemmerer Planning Area *(Continued)*

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
Rock Creek/Tunp	Critical wildlife habitats, cultural values, and SSS plant habitat	Total Surface	No SD	0	MA	63,278	No SD	0	MA	45,863
		BLM-Administered Surface		0		63,278		0		45,863
		BLM-Administered Mineral Estate		0		63,278		0		45,863
Bear River Divide	Critical wildlife habitats, cultural values paleontology resources, and SSS plant habitat	Total Surface	No SD	0	MA	146,322	No SD	0	MA	74,954
		BLM-Administered Surface		0		146,322		0		74,954
		BLM-Administered Mineral Estate		0		147,156		0		74,258
Wild and Scenic Rivers	Wild and scenic values	Number of segments recommended suitable for inclusion in WSR system	No SD	0	WSR	13	No SD	0	WSR	2
Raymond Mountain Wilderness Study Area	Wilderness values	Total Surface	WSA	32,880	WSA	32,880	WSA	32,880	WSA	32,880
		BLM-Administered Surface		32,880		32,880		32,880		32,880
		BLM-Administered Mineral Estate		32,880		32,880		32,880		32,880
Emigrant Springs Back Country Byway	Scenic Values	BLM-Administered Surface	No SD	0	BCB	4.5 miles primitive two-track; 11.0 miles crowned and ditched gravel road	No SD	0	BCB	4.5 miles primitive two-track; 11.0 miles crowned and ditched gravel road

ACEC Area of Critical Environmental Concern
BLM Bureau of Land Management
CBC case-by-case
BCB Back Country Byway
RNA Research Natural Area
SD Special Designation
MA Management Area
SSS Special Status Species
WSA Wilderness Study Area
WSR Wild and Scenic River

2.4.1.2 Physical, Biological, and Heritage Resources

Physical resources are managed under Alternative A to conserve air, water, and soil resources and to support resources and resource uses. The Kemmerer Field Office works cooperatively with the Wyoming DEQ and the Environmental Protection Agency to maintain ambient air quality in the planning area. To

conserve water and soil resources within the planning area, the BLM complies with standard practices and Wyoming BLM mitigation guidelines for surface-disturbing activities on BLM-administered public lands; restricts oil- and gas-related activities on slopes greater than 25 percent; prohibits surface occupancy (i.e., NSO) for fluid minerals on slopes greater than 40 percent; avoids surface-disturbing activities within 500 feet of 100-year floodplains, wetlands, riparian areas, or perennial streams; prohibits use of fire suppression chemicals within 200 feet of surface water; considers lining of reserve pits on a case-by-case basis; and reviews all proposed methods to dispose of produced water to ensure compliance with local, state, and federal laws and regulations. To protect water quality, disposal of water produced from CBNG wells is currently evaluated on a case-by-case basis and requires a soils analysis of the downstream area, as well as additional information necessary to determine compliance with current laws.

Fire and Fuels Management under Alternative A follows the Appropriate Management Response in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* for areas where fire is not desired and for areas where fire can be used as a management tool (BLM 2004f). Prescribed fire, wildland fire use, and chemical, biological, and mechanical treatments, can be used to meet fire and fuels management objectives, improve plant community health, reduce hazardous fuels, and reintroduce fire to its natural role in the ecosystem to meet fire and fuels resource management objectives.

The BLM complies with standard practices and Wyoming BLM mitigation guidelines for land and resource use on BLM-administered public lands.

Biological resources are managed under Alternative A to provide habitat for fish and wildlife, meet public demand for forest products, protect natural functions in riparian areas, control the spread of invasive nonnative species (INNS), and comply with the Endangered Species Act (ESA) and BLM policy for special status plant and animal species. Alternative A does not include specific decisions to conserve large contiguous blocks of habitat, avoid or minimize habitat fragmentation, protect ecological connections between habitat types, identify and manage migration or travel corridors, or retain old growth forests. Alternative A does establish a 500-foot avoidance buffer around wetlands, riparian areas, aquatic habitats, and 100-year floodplains to protect resource values from surface-disturbing activities. Similarly, Alternative A prohibits mixing chemicals within 500 feet of riparian areas, water sources, floodplains, and known special status plant species populations.

Fish and wildlife species conservation under Alternative A generally is supported by the BLM's management of habitat and includes only decisions to address key planning issues and requirements existing when the current plan was established. For example, Alternative A does not apply seasonal limitations on surface-disturbing activities to protect fish resources, but does require new fence construction to meet fencing standards to accommodate wildlife movement.

Special status plant species are specifically protected in a few cases under Alternative A by constraints on resource uses; otherwise, potential impacts to these species are managed on a case-by-case basis. For example, the existing NSO restriction for fluid minerals protects four populations of *Physaria dornii* and a representative cushion plant community from oil and gas development. In addition, potential habitat areas of special status plant species are considered areas of controlled surface use (CSU) for surface-disturbing activities under Alternative A. Special status plant species locations are considered rights-of-way (ROW) avoidance areas under Alternative A, although the authorized officer can grant exceptions. Livestock salt or mineral supplements and range improvement projects are prohibited in areas of special status plant species to protect these species from trampling and grazing by livestock.

Special status wildlife species generally are managed to avoid or minimize impacts from surface disturbance and disruptive activities under Alternative A. For example, surface disturbance is prohibited within ¼ mile of occupied greater sage-grouse leks and human activity between 8 p.m. and 8 a.m. is

avoided between March 1 and May 15 within this buffer. In addition, Alternative A requires avoidance of surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitat that is within 2 miles of occupied greater sage-grouse leks. To protect nesting raptors, Alternative A restricts activity or surface disturbance for up to a ¾-mile radius from any active raptor nest in the planning area from February 1 through July 31. The restrictive buffer is extended to a 1-mile radius for ferruginous hawk nests within the Moxa Arch area of oil and gas development and the timing limitation is extended to August 15 for peregrine falcons. Alternative A does not include specific decisions for conserving pygmy rabbit habitats or white-tailed prairie dog complexes. In addition, Alternative A does not require mitigation to prevent birds from perching on overhead powerlines, restrict high-profile structures within sagebrush obligate habitats, or restrict equipment placement to limit noise levels that may impact wildlife or special status species.

Heritage resources generally are protected by evaluation of potential impacts on a project-by-project basis under Alternative A. Inventories of heritage resources are conducted prior to all surface-disturbing activities, and all significant historical, archeological, cultural sites, and paleontological localities are protected or mitigated under Alternative A. In addition, approximately 480 acres of federal mineral estate in the Bridger Antelope Trap have an NSO restriction for fluid minerals to protect heritage resources under Alternative A. The following specific sites receive additional protection under Alternative A: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, and Alfred Corum emigrant gravesite. Trails are protected from visual intrusion and surface disturbance under Alternative A by a protective corridor extending ¼ mile from either side of NHTs or within the visual horizon of the trail, whichever is closer.

Visual Resource Management (VRM) will continue according to the 1986 VRM maps under Alternative A. The area within the viewshed of the Bridger Antelope Trap lacks specific prescriptions and is managed according to the VRM class for the area under Alternative A.

2.4.1.3 Resource Uses and Support

Mineral resource uses are managed by identifying BLM-administered lands and mineral estate within the planning area suitable for exploration and development of leasable, locatable, and salable minerals. Constraints on mineral resource use in the planning area are identified to protect resource values. For example, some lands within the planning area are currently withdrawn from locatable mineral entry primarily to protect oil shale, coal, and phosphate resources.

Under Alternative A, 104,817 acres of federal mineral estate in the planning area are administratively unavailable for oil and gas leasing. The remaining federal mineral estate in the planning areas is administratively available for oil and gas leasing subject to the following constraints: approximately 261,564 acres are subject to standard stipulations, 844,554 acres are subject to moderate constraints, and 368,427 acres are subject to major constraints. In addition, fluid mineral leasing currently is allowed within areas containing high management level trail segments, within potential habitat for plant and animal species protected by the ESA, and within areas set aside for public recreation. New oil and gas leases will not be issued and existing leases are suspended in the Mechanically Mineable Trona Area (MMTA) under Alternative A.

Coal leasing applications in the planning area (outside of the Raymond Mountain WSA) currently are subjected to the coal-screening process described at 43 Code of Federal Regulations (CFR) 3461. The Haystack Lease by Application was recently screened and all 3,963 acres were determined to be acceptable for further leasing consideration, after exceptions to several unsuitability criteria were applied (BLM 2004b).

Federal mineral estate outside the Raymond Mountain WSA currently is available for leasing for sodium and phosphate. Exploration for sodium is considered on a case-by-case basis under Alternative A. The entire planning area is available for consideration of mineral materials sales and (or) free use permits; however, the Interim Management Policy and Guideline for Lands Under Wilderness Review requires any activity within the Raymond Mountain WSA comply with the nonimpairment criteria (BLM 1995a). The area within the viewshed of the Fossil Butte National Monument, developed campground areas, and areas with special status plant and wildlife species currently are available for consideration of mineral materials sales and (or) free use permits under Alternative A. There are existing withdrawals from locatable mineral entry to protect oil shale, phosphate, and trona resources in the planning area.

Forest use under Alternative A does not specify the acreage of forestlands or woodlands for annual treatment. Alternative A also does not specify the annual allowable probable sale quantity; however, current management restricts the annual volume of timber removal to not exceed the annual sustained yield capacity of the land. Alternative A does not specify any type of management action for old growth forests.

Livestock grazing under Alternative A is managed in accordance with the Standards for Healthy Rangelands.

Disposal of BLM-administered lands may occur under Alternative A for those lands identified for disposal in the existing plan. Lands may be identified for disposal because they are relatively small in area and isolated from large tracts of other BLM-administered lands and, therefore, difficult for the BLM to manage. Most of the areas currently identified for disposal do not occur near communities within the planning area. Although Desert Land Entries are unlikely to occur in the planning area due to soil characteristics, salinity issues, irrigation requirements, and the practicability of farming the lands as an economically feasible operating unit, applications are considered on their merits providing the applicant provides evidence of a water right and an acceptable conservation plan.

ROW corridors were not designated in the 1986 RMP and Alternative A does not identify ROW exclusion areas for the following archeological sites: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and Bear River Divide trail landmark. Decisions regarding ROW corridors, communication sites, and renewable energy projects are not specifically identified in the existing plan and therefore decisions currently are made on a case-by-case basis. Acquisition of access for the Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and the Bear River Divide areas is identified as high priority under Alternative A.

Livestock grazing under Alternative A is managed according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a). Other than a few small parcels that currently are not permitted or leased, the entire planning area is available for livestock grazing. For “I” allotments (see Glossary) Alternative A focuses on improvement, whereas for M and C allotments, the focus is on maintenance. Consideration of temporary nonrenewable permits issued for unallotted parcels will continue. The forage allocation of 827 animal unit months (AUMs) associated with the Lost Creek/Ryan Creek land acquisition will continue to be designated for wildlife use only and not available for livestock use under Alternative A. Forage reserves under Alternative A are not considered, developed campgrounds remain unavailable for livestock grazing, and grazing in the Mike Mathias Wetlands at Wheat Creek Meadows is only available as a management tool. Alternative A does not restrict the distance of livestock salt or mineral supplements from water sources, riparian areas, aspen stands, or special status plant species.

Recreational facilities in the planning area are retained under Alternative A. To protect the recreational experience, the existing NSO restriction for fluid minerals within 400 feet of developed campgrounds also

is retained. Dispersed camping continues to be allowed throughout the planning area under Alternative A according to recreational use rules.

No Special Recreation Management Areas (SRMAs) are designated under Alternative A. Instead, BLM-administered lands within planning area are managed as an Extensive Recreation Management Area (ERMA). Recreation management objectives for the ERMA are developed to address visitor health and safety, user conflict, and resource protection. Recreation management actions are restricted to these custodial actions. Visitation in ERMAs includes a wide variety of dispersed recreational activities. In addition to other multiple uses, the ERMA is managed for primitive and semiprimitive motorized recreational use, and for dispersed uses that do not require developments or facilities.

Travel Management Areas currently are not delineated in the planning area. Motor vehicle travel in the planning area currently is limited to existing roads and trails, except for the Raymond Mountain WSA, where it is prohibited. Existing roads and trails in the planning area are open to mechanized vehicle use and OHV use. Motor vehicle travel is seasonally limited (closed January 1 to April 30) in the Slate Creek, Rock Creek, and Bridger Creek crucial big game winter range areas. Approximately 23 miles of groomed snow machine trails exist in the planning area and new trails are considered on a case-by-case basis under Alternative A. Snow machine use in Pine Creek Canyon currently is limited to the groomed trail. Prior to January 1, snow machine use may occur in Slate Creek, Rock Creek, and Bridger Creek crucial big game winter ranges and the Raymond Mountain WSA. The Raymond Basin is open to snow machine use. Roads and trails are designated according to a transportation plan.

2.4.1.4 Special Designations

Currently, the only ACEC in the planning area is the Raymond Mountain ACEC (Table 2-2). This area was designated for the protection of watershed resources for Bonneville cutthroat trout. Surrounding the Raymond Mountain ACEC is the Raymond Mountain WSA. The Raymond Mountain ACEC is retained and no additional ACECs are proposed under Alternative A. In addition, no Research Natural Areas (RNAs), Wild and Scenic Rivers (WSRs), Back Country Byways, or Other Management Areas (MAs) are either identified, recommended, or proposed for the planning area under Alternative A.

2.4.2 Alternative B

2.4.2.1 Overview of the Alternative

Alternative B emphasizes conservation of physical, biological, and heritage resources by placing the most constraints on resource uses.

Alternative B addresses the key planning issues identified in Chapter 1 by placing more emphasis on conservation of physical, biological, and heritage resources and more constraints on resource uses compared to Alternative A. Relative to all alternatives, Alternative B identifies the most land area for the protection of physical, biological, and heritage resource values; designates the highest number of ACECs (10); identifies the most land area for other management; places the most restrictions on OHV use; places the most constraints on resource uses; and allows leasing on the smallest area for oil and gas, coal, and other solid leasable minerals.

2.4.2.2 Physical, Biological, and Heritage Resources

Physical resources under Alternative B are managed with more of an emphasis toward conserving air, water, and soil resources and less of an emphasis on supporting resource uses compared to Alternative A. For example, under Alternative B, the BLM will enhance existing criteria pollutant and air quality related value monitoring compared to Alternative A. To conserve soil and water resources, Alternative B places additional restrictions on resource uses compared to those described for Alternative A, including prohibiting surface-disturbing activities in areas of sensitive or highly erosive soils with slopes of 10

percent or greater; prohibiting disturbance on fragile soils and soils with chemical or biological crusts, highly erodible characteristics, or low reclamation potential; closing areas within ¼ mile of 100-year floodplains, wetlands, riparian areas, or perennial streams to surface-disturbing activities; prohibiting use of fire suppression chemicals within 500 feet of surface water; requiring all reserve pits be lined (when the preferred closed mud systems for handling drill cuttings are unavailable); and prohibiting disposal of water produced from federal oil and gas wells to streams, other flow-connected surface features, or uplands administered by the BLM.

Fire and fuels management under Alternative B is similar to that described for Alternative A. However, Alternative B sets acreage thresholds for meeting fire and fuels management objectives and for reintroducing fire to its natural role in the ecosystem.

Biological resources management under Alternative B places more emphasis on conservation of habitat for fish and wildlife, ecosystem management, protection of natural functions in riparian areas, control of INNS, and more constraints on resource uses that may impact biological resources compared to Alternative A. For example, to protect habitat, Alternative B emphasizes the management of large, contiguous blocks of federal land by maintaining or enhancing sagebrush, aspen, and mountain shrub communities and maintaining connections between these vegetation types. Alternative B also restricts habitat fragmentation to no more than 3 percent of available habitats in identified special status species habitats; identifies and preserves migration and travel corridors for big game, migratory birds, and special status species; and retains old growth forests. To protect wetlands, riparian areas, aquatic habitats, and 100-year floodplains, Alternative B extends the current 500-foot buffer prohibiting surface-disturbing activities to ¼ mile. Alternative B also extends the current 500-foot buffer around riparian areas, water sources, and floodplains to ¼ mile for mixing of chemicals. In addition, aerial application of chemicals is not allowed within ½ mile of wetlands, riparian areas, and aquatic habitats and special status plant species under Alternative B.

Fish and wildlife and special status wildlife species under Alternative B are protected by more constraints compared to Alternative A. For example, Alternative B applies seasonal limitations for surface-disturbing activities within the floodplain or within 1,000 feet of fish-bearing streams to protect fish resources. To prevent birds from perching on overhead powerlines, Alternative B requires all new low voltage utility lines be buried and BLM-approved anti-perching devices be installed on all new high voltage utility lines. Alternative B also removes or modifies all BLM fences to comply with fencing standards that accommodate wildlife movement.

Special status plant species receive increased protection under Alternative B compared to Alternative A. For example, all locations of *Physaria dornii* have NSO restrictions for fluid minerals and all surface-disturbing activities are prohibited in any potential habitat areas of special status plant species under Alternative B. In addition, special status plant species locations are considered ROW exclusion areas under Alternative B compared to avoidance areas under Alternative A. Alternative B increases protection for special status plant species more than Alternative A by adding a ½-mile buffer within which livestock salt or mineral supplements and range improvements are not allowed, unless they benefit these plant species.

Special status wildlife species receive increased protection under Alternative B compared to Alternative A. For example, protection of greater sage-grouse is increased by extending the temporal human activity avoidance buffer an additional month to February 1 within ¼ mile of the perimeter of occupied greater sage-grouse leks between 8 p.m. and 8 a.m. In addition, Alternative B prohibits disruptive activity within ¼ mile of the perimeter of active greater sage-grouse leks. Alternative B also prohibits surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitat within 2 miles of occupied greater sage-grouse leks or in identified nesting or brood-rearing habitats outside the 2-

mile buffer from March 15 through July 15. Unlike Alternative A, Alternative B also protects greater sage-grouse during the winter by prohibiting surface-disturbing and disruptive activities in suitable winter concentration areas from November 15 through April 30. Alternative B increases protection of nesting raptors, by extending the buffer prohibiting surface-disturbing and disruptive activities to 1½ miles of an active raptor nest during the following times.

- February 1 through July 15 (unidentified raptor nest)
- March 1 through July 31 (short-eared, long-eared, and screech owl, ferruginous hawk, peregrine falcon)
- April 1 through July 31 (osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, Cooper's hawk)
- April 1 through September 15, or whenever the young have fledged (burrowing owl)
- April 1 through August 31 (northern goshawk)

To protect special status mammal wildlife species, Alternative B prohibits surface-disturbing activities in identified pygmy rabbit habitats and prohibits surface-disturbing and disruptive activities in all white-tailed prairie dog colonies or complexes 100 acres or greater in size. To protect special status sagebrush obligate wildlife species, Alternative B prohibits new high-profile structures within 1 mile of occupied sagebrush obligate habitats and prohibits these structures from relying on guy wires for support in these habitats. To minimize the impacts of continuous noise on special status species, Alternative B requires facilities not exceed 49 decibels (dB) as measured 150 feet from the noise source.

Heritage resources benefit from more protection under Alternative B compared to Alternative A. For example, heritage resources are researched and tribes are consulted proactively to identify all sensitive sites within the planning area under Alternative B. All significant historical, archeological, cultural sites, and paleontological localities are protected or mitigated under Alternative B. In addition, surface-disturbing activities, OHV use, prescribed burns, and vegetation treatments are prohibited in approximately 640 acres of federal mineral estate encompassing the Bridger Antelope Trap. Alternative B also protects specific cultural sites by prohibiting establishment of ROW corridors, wind-energy projects, surface-disturbing activities, OHV use, prescribed burns, and vegetation treatments within the boundaries of: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and Bear River Divide trail landmark. The physical evidence of NHTs receive additional protection under Alternative B by extending the surface-disturbing activities buffer on either side of trails to 1 mile for high management level segments, ½ mile for medium management level segments, and ¼ mile for low management level segments.

VRM under Alternative B updates the planning area classification as: Class I – Raymond Mountain WSA; Class II – 3-mile buffer around all sensitive roads, NHTs, campgrounds, towns, and sites listed on the National Register of Historic Places (NRHP); Class III – Pine Creek Ski Area and Lion's Club Park Recreation and Public Purposes (R&PP) leases; and Class IV – areas of high human disturbance and low visual stimulation. The rest of the planning area is managed as Class III under Alternative B. Overall, Alternative B provides more protection of the viewshed compared to Alternative A. For example, Alternative B preserves the viewshed within 10 miles of the Bridger Antelope Trap juniper fence, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs by prohibiting ROW corridors and other developments with structures greater than 12-feet high. Viewsheds of NHT segments are increased under Alternative B to 10

miles (high management level segments), 5 miles (medium management level segments), and ½ mile (low management level segments).

2.4.2.3 Resource Uses and Support

Mineral resource uses are constrained more under Alternative B compared to Alternative A. For example, in addition to existing withdrawals for locatable minerals, Alternative B withdraws developed campgrounds, federal mineral estate encompassing the Bridger Antelope Trap, areas with known locations of special status species (plants and wildlife), and the Cokeville Meadows National Wildlife Refuge (NWR) from operation of the mining laws.

Under Alternative B, 710,058 acres of federal mineral estate are administratively unavailable for oil and gas leasing. The remaining federal mineral estate in the planning area is administratively available for oil and gas leasing subject to the following constraints: approximately 13,796 acres are subject to standard stipulations, 103,704 acres are subject to moderate constraints, and 751,804 acres are subject to major constraints, In addition, to protect resource values, Alternative B does not allow new fluid mineral leasing on currently unleased areas within potential habitats for plant and wildlife species protected by the ESA, within 5 miles of high management level trail segments, and within areas set aside for public recreation. Moreover, when current fluid mineral leases expire they will not be reoffered in these areas under Alternative B. New oil and gas leases will not be issued and existing leases are suspended in the MMTA under Alternative B.

Mineral resource uses are constrained more under Alternative B compared to Alternative A.

Coal leasing is more constrained under Alternative B compared to Alternative A. No new coal leasing is considered in the planning area.

Federal mineral estate within the planning area is available under Alternative B for sodium and phosphate leasing with the following exceptions: the viewshed of Fossil Butte National Monument and viewshed of incorporated towns and cities. In addition, to protect resource values, areas with special status plant and wildlife species are closed to sodium and phosphate mineral development. Alternative B does not allow mineral materials sales and (or) free use permits within the Raymond Mountain WSA, the viewshed of Fossil Butte National Monument, within ½ mile of developed campground areas, or areas with special status plant and wildlife species.

Forest use under Alternative B restricts the annual treatment (i.e., mechanical methods or prescribed fire) of forestland and woodland to approximately 50 acres each year (500 acres per decade) to manage stocking levels to more historical conditions. In addition, Alternative B restricts the allowable probable sale quantity in the planning area to annually 444 hundred cubic feet (CCF) (200 thousand board feet [MBF]); or per decade 4,440 CCF (2 million board feet [MMBF]). Approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA are managed by fire to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives; however, no mechanical or surface-disturbing activities and no removal of forest products are allowed in this area. Under Alternative B, old growth forest areas are retained and other forested areas may be restored to old growth conditions at appropriate locations.

Under Alternative B, disposal of BLM-administered lands is not considered, and no BLM-administered lands are available for agricultural entry under Desert Land Entry. ROW exclusion areas are established on BLM-administered lands for the archeological sites identified in Alternative A to protect heritage resource values. To further protect resource values, Alternative B also does not designate corridors through NRHP identified sites or where they are in conflict with NHT management objectives. To minimize surface disturbance, Alternative B limits preferred corridors to ¼-mile wide and requires new

intrastate pipelines to link the Jonah Gas/Pinedale Anticline Fields to existing plant sites in the planning area and new interstate pipelines to follow the existing California and Pacific Coast states pipelines. To minimize surface disturbance and habitat fragmentation, Alternative B consolidates communication sites in four areas (Quealy Peak, Medicine Butte, Hickey Mountain, and the BLM Wareyard). Alternative B also prohibits wind-energy projects in areas containing important resource values, including crucial winter range, active raptor nests, raptor migration corridors, potential nesting habitat and leks of greater sage-grouse, within 5 miles of significant cultural sites, the Raymond Mountain WSA, Class A or B scenery areas, or areas of sensitive and highly erosive soils. High priority areas for access identified under Alternative B are the same as described under Alternative A.

Livestock grazing continues to be managed on 224 grazing allotments according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a) under Alternative B. However, Alternative B imposes more constraints on livestock grazing compared to Alternative A. For example, the planning area is available to livestock grazing on a case-by-case basis under Alternative B, where it does not conflict with other resources. No temporary nonrenewable permits for unallotted parcels are issued under Alternative B. Instead of focusing on livestock and improving or maintaining the grazing allotment categories described in Alternative A, grazing systems and range improvements are managed to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources under Alternative B. Suspended AUMs are not activated for livestock use under Alternative B. Alternative B manages unalloted public lands containing riparian areas, excluding stock trails, with emphasis on wildlife and watershed objectives, and excludes livestock uses. In addition, under Alternative B, the Christy Canyon Allotment is designated as a forage reserve and developed campgrounds and the Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing. To protect resource values, Alternative B prohibits livestock salt or mineral supplements within ½ mile of water sources, riparian areas, aspen stands, or special status plant species.

Recreational facilities in the planning area are retained under Alternative B; however, no new facilities will be developed. To further protect the recreational experience, the existing NSO restrictions for fluid minerals within 400 feet of developed campgrounds are expanded to ¼ mile under Alternative B. Under Alternative B, the Pine Creek Canyon, Raymond Mountain, selected BLM-administered lands in the Dempsey Ridge area, and high management level segments of the Oregon-California National Historic Trail are designated SRMAs and intensively managed for recreation. Most of the visitors to these areas are from southwest Wyoming and northeast Utah. Pine Creek Canyon SRMA is heavily used during the hunting season for camping and in the winter for snowmobiling. The management goal for the canyon is to enhance recreational opportunities, such as camping and snowmobiling, while protecting riparian areas and wildlife winter ranges. Recreation in the Raymond Mountain SRMA is restricted to wilderness experiences, such as hiking, hunting, primitive camping, and horseback riding. Recreation in the Oregon-California National Historic Trail SRMA primarily is visiting and learning about trail history, and motor vehicle use is restricted to designated roads and trails. The Dempsey Ridge SRMA encourages motorized recreation along the proposed Emigrant Springs Back Country Byway to encourage learning about NHTs. Remaining acreage in the planning area is designated as an ERMA and management is primarily custodial. Under Alternative B, dispersed camping (in accordance with recreational use rules) continues to be allowed in the planning area; however, riparian areas are closed to camping to protect resource values.

Travel Management Areas are established and travel management plans will be completed under Alternative B following signing of the Record of Decision (ROD) for the Kemmerer RMP. Motor vehicle travel in the planning area under Alternative B has more restrictions than Alternative A. For example, Alternative B limits motor vehicle travel and OHV use to crowned and ditched roads and closes motor vehicle travel from November 15 to April 30 in Slate Creek, Rock Creek, and Bridger Creek crucial big

game winter range areas. Alternative B also closes Raymond Mountain, Green Hill, the trail to Commissary Ridge, select NHT segments, riparian and wetland areas, and special status plant species populations to motor vehicle use and OHV use. The existing 23 miles of groomed snow machine trails in the planning area remain open under Alternative B; however, no new snow machine trails will be developed in crucial big game winter range to protect resource values. The current seasonal restriction on snow machine use in Slate Creek, Rock Creek, Bridger Creek, crucial big game winter ranges, and in the Raymond Mountain WSA is extended from November 15 to April 15 under Alternative B.

2.4.2.4 Special Designations

The Raymond Mountain WSA and ACEC are retained under Alternative B and nine additional ACECs, including the Raymond Mountain Expansion, are designated (Table 2-2). Under Alternative B, two of the nine proposed ACECs (special status plant species and cushion plant communities) also are proposed for designation as RNAs. In addition, the proposed Fossil Basin ACEC is identified as an Management Area (MA). Other MAs identified under Alternative B include Rock Creek/Tunp and Bear River Divide. Alternative B also recommends 13 waterway segments for inclusion in the National Wild and Scenic Rivers system, the most of any alternative. Alternative B also proposes the Emigrant Springs Back Country Byway. In general, Alternative B designates the most acreage in the planning area as ACECs and identifies the most RNAs, MAs, and waterway segments suitable for inclusion in the WSR system compared to all other alternatives. The designations of ACECs and RNAs, the identification of MAs, and inclusion of suitable waterway segments in the WSR system under Alternative B conserve physical, biological, and heritage resources more and constrain resource uses more than the other alternatives.

2.4.3 Alternative C

2.4.3.1 Overview of the Alternative

Alternative C addresses the key planning issues identified in Chapter 1 by placing more emphasis on resource uses (e.g., energy and mineral development, recreation, and forest products) and by maintaining or reducing constraints placed on resource uses to protect physical, biological, and heritage resource values. Compared to all alternatives, Alternative C conserves the least land area for protecting physical, biological, and heritage resource values; designates no ACECs; identifies the smallest area for other management; is the least restrictive to OHV use; places the fewest constraints on resource uses; and allows the most land area for oil and gas and other solid leasable minerals leasing.

Alternative C addresses the key planning issues identified in Chapter 1 by placing more emphasis on resource uses and by maintaining or reducing constraints placed on resource uses to protect physical, biological, and heritage resource values.

2.4.3.2 Physical, Biological, and Heritage Resources

Physical resources under Alternative C are managed with a similar emphasis as Alternative A with respect to conserving air, water, and soil resources and constraining resource uses. For example, under Alternative C, the BLM will retain current management actions for maintaining and monitoring ambient air quality. With the exception of allowing use of fire suppression chemicals near surface water, Alternative C places a similar emphasis on conservation of soil and water resources within the planning area compared to Alternative A.

Fire and fuels management under Alternative C places more emphasis on suppression and less emphasis on conservation of soil, water, and special status species compared to Alternative A. For example, all wildland fires in the planning area are suppressed under Alternative C. Unlike Alternative A, use of prescribed fire, wildland fire, and chemical, mechanical, and biological treatments are not considered in

meeting fire and fuels management objectives, to reduce hazardous fuels, or to reintroduce fire to its natural role in the ecosystem under Alternative C.

Biological resources under Alternative C are managed similar to Alternative A; however, additional conservation under Alternative C includes avoiding habitat fragmentation in identified special status species habitat; identifying and developing management for migration and travel corridors for big game, migratory birds, and special status species; and retaining old growth forest areas at appropriate locations and distribution levels. Alternative C reduces the current protective buffer to 100 feet around riparian areas, water sources, and floodplains for mixing chemicals.

Fish and wildlife and special status wildlife species under Alternative C receive similar protection compared to Alternative A. However, Alternative C specifically includes decisions to not require burial of new low-voltage utility lines, or installation of BLM-approved anti-perch devices on new high-voltage utility lines.

Special status plant species generally receive the same or less protection under Alternative C compared to Alternative A. Examples of less protection for special status plant species under Alternative C include removing the current NSO restriction for fluid minerals in four populations of *Physaria dornii* and the representative cushion plant community; and removing the CSU limitation on surface-disturbing activities in potential habitat areas of special status plant species.

Special status wildlife species under Alternative C generally receive similar protection compared to Alternative A. For example, protections for greater sage-grouse are the same as Alternative A, except Alternative C also avoids disruptive activities in the ¼-mile buffer around occupied leks. Alternative C provides greater temporal protection (see Alternative B) for nesting raptors compared to Alternative A; however, disruptive activities are prohibited only to ½ mile under Alternative C. Alternative C avoids surface-disturbing activities in occupied pygmy rabbit habitats and continues the lack of limitations on equipment noise levels to protect species relying on aural cues for successful breeding.

Heritage resources under Alternative C are similarly protected compared to Alternative A. Differences under Alternative C include: heritage resources are managed on a project-by-project basis where known site types are encountered, and Class II or III inventories are conducted in areas where impacts from activities are likely; however, inventories are not required in low site-density areas for future projects. Current management of federal mineral estate in the Bridger Antelope Trap continues and all significant historical, archeological, and cultural sites are protected or mitigated. Alternative C provides a narrower corridor compared to Alternative A for protecting the physical evidence of NHT segments. The protective buffer on either side of NHTs under Alternative C depends on the trail segment and includes ¼ mile for high management level, 500 feet for medium management level, and 100 feet for low management level trail segments.

VRM under Alternative C uses the same classification system compared to Alternative A, except the Raymond Mountain WSA is managed as Class I and high potential wind-energy areas are managed as Class IV. Alternative C continues current VRM management of the Bridger Antelope Trap compared to Alternative A. Viewshed protection for NHT segments changes under Alternative C to 1 mile (high management level segments), ¼ mile (medium management level segments), and in accordance with the surrounding VRM class for low management level segments.

2.4.3.3 Resource Uses and Support

Mineral resource uses and associated constraints under Alternative C are similar to Alternative A. Alternative C lifts existing locatable mineral withdrawals intended to protect oil shale, coal, and

phosphate resources in the planning area. This action allows staking of mining claims in those previously withdrawn areas. No new withdrawals are considered, except the Cokeville Meadows NWR.

Under Alternative C, the same acreage (104,817) is administratively unavailable for oil and gas leasing compared to Alternative A. The remaining federal mineral estate in the planning area is administratively available for oil and gas leasing subject to the following constraints: approximately 265,414 acres are subject to standard stipulations, 860,249 acres are subject to moderate constraints, and 348,882 acres are subject to major constraints. Similar to Alternative A, fluid mineral leasing is allowed under Alternative C within areas containing high management level trail segments, within potential habitat for plant and wildlife species protected by the ESA, and within areas set aside for public recreation. Alternative C retains the constraints on oil and gas leasing in the MMTA; however; the withholding could be lifted if future technology provides the ability to safely develop the oil and gas leases.

Coal leasing under Alternative C is subject to similar constraints compared to Alternative A. Applications for coal leasing outside the Raymond Mountain WSA are subjected to the coal-screening process, and federal mineral estate within the proposed Haystack Lease By Application is determined to be acceptable for further consideration for coal leasing under Alternative C.

Similar to Alternative A, the planning area outside of the Raymond Mountain WSA is available for leasing solid minerals other than coal, subject to special considerations to protect resource values during exploration and mineral development. Mineral material sales and (or) free use permits under Alternative C are subject to the same constraints identified for Alternative A.

Forest use under Alternative C restricts the annual treatment (i.e., mechanical methods or prescribed fire) of forestland and woodland to approximately 150 acres and 100 acres, respectively, each year (1,500 acres and 1,000 acres per decade) to manage stocking levels and structure and (or) composition toward historical conditions. In addition, Alternative C identifies an allowable probable sale quantity of 1,333 CCF (600 MBF); or per decade 13,330 CCF (6 MMBF). Under Alternative C, management of 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA is the same as described for Alternative B. Under Alternative C, old growth forest areas are retained at appropriate locations and distribution levels and connectivity of existing or potential old growth areas are adopted whenever feasible.

Disposal of BLM-administered lands under Alternative C are the same as Alternative A and additional parcels are considered on a case-by-case basis.

Disposal of BLM-administered lands under Alternative C are the same as Alternative A and additional parcels are considered on a case-by-case basis. Applications for Desert Land Entry are considered as described for Alternative A.

ROWs and corridors under Alternative C are managed similarly to Alternative A; that is, on a case-by-case basis. Corridor widths are not restricted, communication sites are considered on a case-by-case basis, and placement of corridors is not prohibited in archeological sites under Alternative C. With the exception of the Raymond Mountain WSA and the Bridger Antelope Trap, Alternative C allows for wind and other renewable energy development throughout the planning area. Access across public lands is pursued, as needed, in support of resource programs and with an emphasis on specific areas identified in Table 2-3.

Livestock grazing continues to be managed on 224 grazing allotments according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a) under Alternative C. Temporary nonrenewable permits for unallotted parcels are issued and grazing is allowed on all public lands in the planning area, including on small isolated tracts currently not permitted or leased for grazing. Grazing

system and range improvements are designed to maximize livestock grazing while maintaining other resource values under Alternative C. Suspended AUMs are activated for livestock use under Alternative C if monitoring data determine forage is available. The forage allocation of 827 AUMs associated with the Lost Creek/Ryan Creek land acquisition is available for wildlife and livestock use under Alternative C. In addition, the Christy Canyon Allotment is not designated as a forage reserve, developed campgrounds may be available for livestock grazing on a case-by-case basis, and the Mike Mathias Wetlands at Wheat Creek Meadows is available for livestock grazing.

Recreational facilities in the planning area are retained and enhanced and additional recreational facilities are developed, where appropriate, under Alternative C. The current NSO restriction for fluid minerals within 400 feet of developed campgrounds remains under Alternative C. Similar to Alternative B, four SRMAs are designated under Alternative C (Pine Creek Canyon, Raymond Mountain, Oregon-California National Historic Trail, and Dempsey Ridge). All other areas in the planning area not included in an SRMA are managed as the ERMA, where recreation management is limited to custodial actions only. Under Alternative C, dispersed camping (according to recreational use rules) continues to be allowed throughout the planning area.

Travel Management Areas are established and travel management plans will be completed under Alternative C following signing of the ROD for the Kemmerer RMP. Roads and trails are designated according to a transportation plan. Motor vehicle travel in the planning area under Alternative C is limited to existing roads and trails outside of the Raymond Mountain WSA; however, unlike Alternative A, no seasonal closures exist and select parts of the planning area are designated open for OHV use under Alternative C (see Map B). The existing 23 miles of groomed snow machine trails in the planning area remain open under Alternative C and new trails are considered on a case-by-case basis. The current seasonal limitations on snow machine use in Slate Creek, Rock Creek, and Bridger Creek crucial big game winter ranges and in the Raymond Mountain WSA are removed under Alternative C. The Raymond Basin is open to snow machine use. In addition, the entire Pine Creek Canyon area is available for snow machine use under Alternative C.

2.4.3.4 Special Designations

The existing Raymond Mountain WSA is retained, the Raymond Mountain ACEC is not retained, and no new areas are designated or identified as ACECs, RNAs, MAs, WSAs, water segments suitable for inclusion in the WSR system, or Back Country Byways under Alternative C. Compared to all alternatives, Alternative C designates the least acreage of special designations and identifies the least area (none) for other management. The lack of special designations under Alternative C results in the least constraint on resource uses compared to all alternatives.

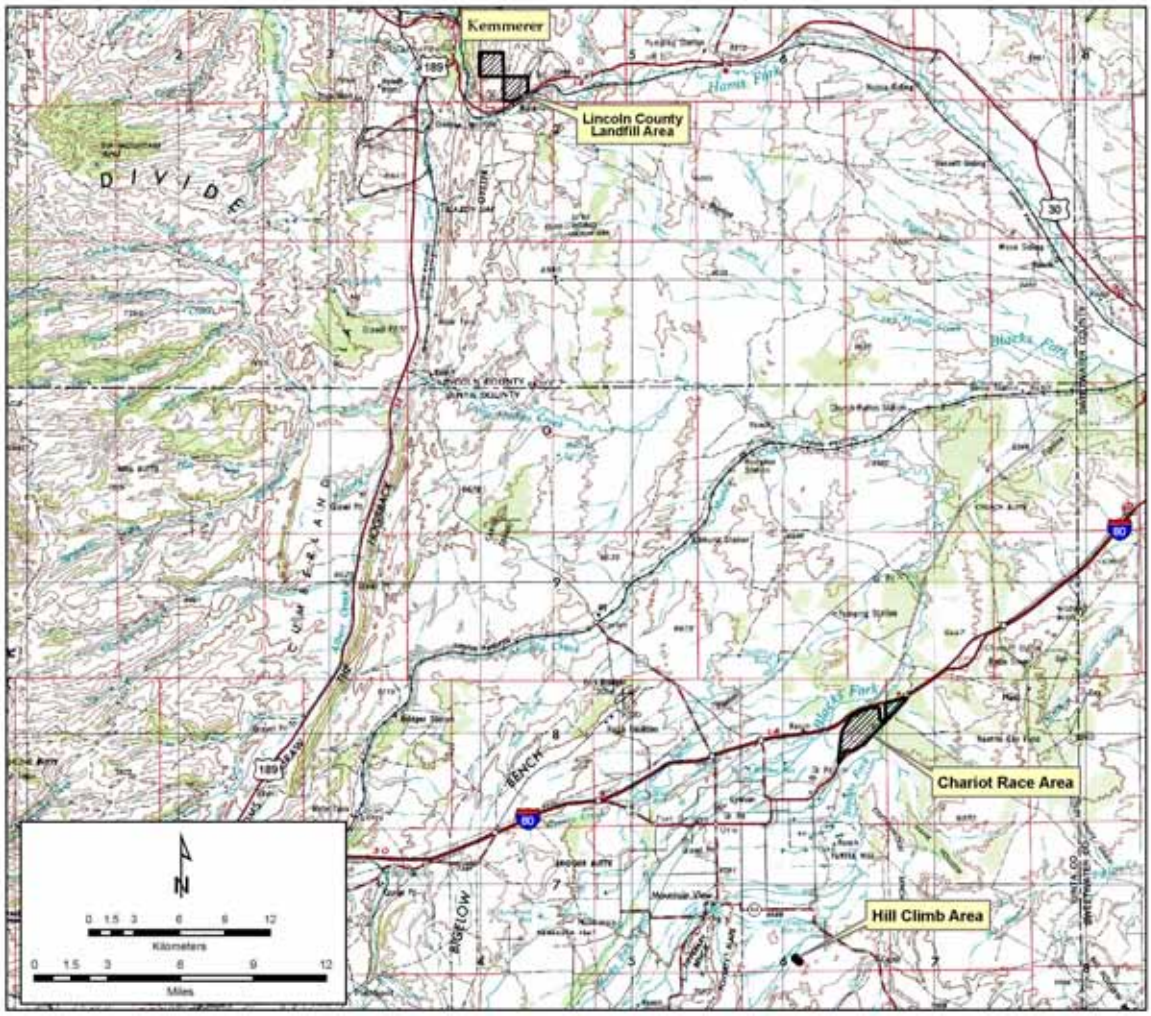
2.4.4 Alternative D (Preferred Alternative)

2.4.4.1 Overview of the Alternative

Alternative D addresses the key planning issues identified in Chapter 1 by emphasizing a moderate level of protection for physical, biological, and heritage resource values and moderate constraints on resource uses. Alternative D is a balanced approach to land management that the BLM believes best addresses the issues, management concerns, and purpose and need for revising the existing RMP. For these reasons, Alternative D represents the BLM's preferred alternative.

Alternative D increases conservation of physical, biological, and heritage resources relative to current management.

Map B. Off-Highway Vehicle Open Areas in the Kemmerer Planning Area Under Alternative C and (or) Alternative D



Note: Under Alternative C, the Hill Climb, Chariot Race, and Lincoln County Landfill areas are open to off-highway vehicle use. Under Alternative D, the Hill Climb and Chariot Race areas are open to off-highway vehicle use.

2.4.4.2 Physical, Biological, and Heritage Resources

Physical resources under Alternative D are managed with more of an emphasis toward conserving air, water, and soil resources and a similar emphasis toward supporting resource uses compared to Alternative A. For example, the BLM will enhance existing criteria pollutant and Air Quality Related Value monitoring on a project-specific or as-needed basis under Alternative D. To conserve soil and water resources, Alternative D places additional restrictions on resource uses compared to those described for Alternative A, including avoiding surface disturbance on slopes of 20 percent or greater on sensitive soil types; avoiding disturbances on fragile soils and soils with chemical or biological crusts, highly erodible characteristics, or low reclamation potential; lining all reserve pits unless other, more effective methods are necessary to prevent impacts; and requiring a BLM-approved disposal plan to dispose of water produced from federal oil and gas wells on BLM-administered land.

Physical resources under Alternative D are managed with more of an emphasis toward conserving air, water, and soil resources and a similar emphasis toward supporting resource uses compared to Alternative A.

Fire and fuels management under Alternative D places more emphasis on protection of soil, water, and special status species compared to Alternative A. Under Alternative D, use of prescribed fire, wildland fire use, and chemical, mechanical, and biological treatments to meet fire and fuels management objectives, to improve plant community health, and to reintroduce fire to its natural role in the ecosystem are based on acreage thresholds.

Biological resources management under Alternative D places more emphasis on conservation of habitat for fish and wildlife, ecosystem management, protection of natural functions in riparian areas, control of INNS, and more constraints on resource uses that may impact biological resources compared to Alternative A. For example, Alternative D manages large, contiguous blocks of federal land by maintaining or enhancing sagebrush, aspen, and mountain shrub communities and by maintaining connections between these communities. In addition, Alternative D avoids habitat fragmentation in identified special status species habitat; identifies and works collaboratively to develop management of migration corridors for big game, migratory birds, and special status species; retains old growth forest areas; and potentially restores other forested areas to old growth conditions.

Fish and wildlife and special status wildlife species under Alternative D are protected by more constraints on resource uses compared to Alternative A. For example, Alternative D applies seasonal limitations for surface-disturbing activities in fish-bearing streams to protect fish resources on a case-by-case basis. To prevent birds from perching on overhead powerlines, Alternative D requires burying new utility lines or installing BLM-approved anti-perching devices on all new utility lines within sagebrush and (or) semiarid shrub-dominated habitats. Alternative D relies on impact analysis to determine whether installing anti-perch devices and (or) burying utility lines are necessary. To protect special status wildlife species, Alternative D avoids new high-profile structures within 1 mile of occupied sagebrush obligate habitats unless anti-perch devices are installed on the structures. Alternative D also prohibits these structures from relying on guy wires for support in these habitats; however, exceptions can be granted. Alternative D eliminates or modifies existing fences on a case-by-case basis to reduce conflicts with wildlife movement.

Special status plant species under Alternative D generally receive the same or more protection compared to Alternative A. Examples of more protection include closing known locations of special status plant species to: surface-disturbing activities that could adversely impact the plants or their habitat; mining claim location; mineral material sales; off-road vehicle use; and explosives and blasting. The current NSO restriction for fluid minerals in four populations of *Physaria dornii* is removed; however, the NSO restriction for fluid minerals is retained relative to all representative cushion plant communities under Alternative D.

Special status wildlife species under Alternative D receive more protection compared to Alternative A. For example, protection of greater sage-grouse described for Alternative A is increased under Alternative D by avoiding surface occupancy within ¼ mile of occupied leks. In addition, Alternative D adds the requirement to avoid surface-disturbing and disruptive activities in greater sage-grouse nesting and early brood-rearing habitat within 2 miles of occupied greater sage-grouse leks or in identified nesting or brood-rearing habitats outside the 2-mile buffer from March 15 through July 15. Finally, Alternative D requires avoiding disturbing and disruptive activities in occupied greater sage-grouse habitat from November 15 through March 14. Prohibiting surface-disturbing and disruptive activities to protect active raptor nests is similar to Alternative A, but with the following spatial and temporal buffers under Alternative D.

- 1-mile buffer for ferruginous hawk nests within the entire planning area; ¾-mile buffer for all other raptors
- February 1 through July 15 (unidentified raptor nest)

- March 1 through July 31 (short-eared, long-eared, and screech owl, ferruginous hawk, peregrine falcon)
- April 1 through July 31 (osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, Cooper's hawk)
- April 1 through September 15, or whenever the young have fledged (burrowing owl)
- April 1 through August 31 (northern goshawk)

Compared to Alternative A, Alternative D includes specific decisions to protect pygmy rabbits and white-tailed prairie dogs. Alternative D avoids development in occupied pygmy rabbit habitats and avoids disruptive activities that could collapse burrows in occupied white-tailed prairie dog colonies or complexes greater than 200 acres. To minimize the impacts of continuous noise on species that rely on aural cues for successful breeding, Alternative D requires that facilities do not exceed 49 dB as measured 900 feet from the noise source.

Heritage resources benefit from more protection under Alternative D compared to Alternative A. Under Alternative D, the timing and degree of Native American consultation is determined by the presence of known site types and tribal concerns for specific types of projects until such time that zones of high, medium, and low probability are established. The current Class I overview will be used to proactively identify zones of high, medium, and low probability and Class III inventories will be conducted in zones with the greatest threats to cultural resources. Alternative D protects 640 acres of federal mineral estate containing the Bridger Antelope Trap by implementing an NSO restriction for fluid minerals and by restricting OHV use to established roads in this area. To protect cultural resources from surface-disturbing activities, Alternative D implements an NSO restriction for fluid minerals on newly issued leases, restricts OHV use to established roads, and designates the following sites as ROW exclusion areas: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and the Bear River Divide trail landmark. All significant historical, archeological, cultural sites, and paleontological localities are protected or mitigated under Alternative D. Alternative D provides a narrower corridor to protect the physical evidence of NHT segments compared to Alternative A. The protective buffer on either side of NHTs under Alternative D depends on the trail segment and includes ¼ mile for high management level, 500 feet for medium management level, and 100 feet for low management level trail segments.

VRM under Alternative D updates the classification system compared to Alternative A. Class I under Alternative D is the Raymond Mountain WSA. VRM Classes II, III, and IV comprise specific parts of the planning area as described in Table 2-3. To protect the viewshed within 3 miles of the Bridger Antelope Trap juniper fence, Alternative D identifies this area as unsuitable for ROW corridors or high-profile structures (higher than 12 feet) particularly wind power. Alternative D also protects the viewshed from high-profile structures within 3 miles of select archeological sites (see Table 2-3). Viewshed protection for NHT segments increases under Alternative D up to 3 miles (high management level segments), up to ½ mile (medium management level segments), and in accordance with the surrounding VRM class for low management level segments.

2.4.4.3 Resource Uses and Support

Mineral resource uses are constrained more under Alternative D compared to Alternative A. For example, in addition to existing withdrawals, Alternative D withdraws developed campgrounds, the BLM-administered surface of the Bridger Antelope Trap, areas with special status plant species, and the Cokeville Meadows NWR from operation of the mining laws.

Under Alternative D, 181,716 acres of federal mineral estate are administratively unavailable for oil and gas leasing. The remaining federal mineral estate in the planning area is administratively available for oil and gas leasing subject to the following constraints: 64,171 acres are subject to standard stipulations; 1,042,502 acres are subject to moderate constraints; and 290,973 acres are subject to major constraints. Fluid mineral leasing is similar to Alternative A, except areas set aside for public recreation are administratively unavailable for oil and gas leasing. New fluid mineral leasing is withheld and existing leases continue to be suspended indefinitely in the MMTA under Alternative D; however, the withholding could be lifted if future technology provides the ability to safely develop the oil and gas leases.

Coal leasing under Alternative D is subject to constraints similar to Alternative A. Federal mineral estate within the Haystack Lease By Application area is determined to be acceptable for further consideration for coal leasing.

Mineral resource uses are constrained more under Alternative D compared to Alternative A.

Under Alternative D, leasing for sodium and phosphate are subject to the same constraints as Alternative A. Areas with special status plant or wildlife species are not closed to sodium or phosphate development under Alternative D. Mineral material sales and (or) free use permits are prohibited within the Raymond Mountain WSA, within developed campgrounds (unless impacts to campground users are minimal), and within actual special status plant species locations.

Forest use under Alternative D restricts the annual treatment (i.e., mechanical methods or prescribed fire) of forestland and woodland to approximately 75 acres each year (750 acres per decade) to manage stocking levels to more historical conditions. In addition, Alternative D identifies an annual allowable probable sale quantity of annually 667 CCF (300 MBF); or per decade, 6,670 CCF (3 MMBF). Under Alternative D, management of approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA is the same as described for Alternative B. Under Alternative D, old growth forest areas are retained and other forested areas are restored to old growth conditions at appropriate locations.

Disposal of BLM-administered lands under Alternative D are the same as alternatives A and C, but less acreage is potentially disposed. Additional parcels for disposal are considered on a case-by-case basis. Applications for Desert Land Entry are considered as described for Alternative A.

Preferred corridors under Alternative D can be up to 2 miles wide. However, Alternative D prohibits placement of ROW in seven archeological sites identified in Table 2-3 to protect heritage resource values. Consolidated communication sites are considered by type in 23 designated areas; other communication sites are considered on a case-by-case basis. Alternative D identifies preferred areas (see Table 2-3) for wind-energy development and considers renewable energy projects other than wind on a case-by-case basis throughout the planning area. Under Alternative D, legal access across private land is sought if a need is identified in support of resource programs and in areas of emphasis.

Recreation facilities are maintained and enhanced and additional recreational facilities are developed where appropriate under Alternative D.

Livestock grazing continues to be managed on 224 grazing allotments according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming* (BLM 1998a) under Alternative D. The same area available for livestock grazing under Alternative A remains available under Alternative D. The Lost Creek/Ryan Creek acquisition area is managed the same as Alternative A. Issuance of temporary nonrenewable permits for unallotted parcels is a discretionary decision for the BLM under Alternative D. Additional sustained yield forage would be allocated for livestock use on a case-by-case basis. In addition, under Alternative D, the Christy Canyon Allotment is designated as a forage reserve.

Alternative D increases the buffer prohibiting livestock salt or mineral supplements to ¼ mile of water sources, riparian areas, aspen stands, or special status plant species. Range-improvement projects are not allowed on special status plant species populations under Alternative D.

Recreational facilities are maintained and enhanced and additional recreational facilities are developed, where appropriate, under Alternative D. The current NSO restriction for fluid minerals within 400 feet of developed campgrounds remains under Alternative D. Similar to Alternative B, the Pine Creek Canyon, Raymond Mountain, Oregon-California National Historic Trail, and select BLM-administered lands in the Dempsey Ridge area are designated as SRMAs within the planning area under Alternative D. All other areas not included in one of the SRMAs are included in the ERMA and managed as such. Dispersed camping (according to recreational use rules) continues to be allowed under Alternative D.

Travel Management Areas are established and travel management plans will be completed under Alternative D following signing of the ROD for the Kemmerer RMP. Motor vehicle travel in the planning area under Alternative D generally is limited to existing roads and trails, and is more restrictive compared to Alternative A. For example, Alternative D closes Raymond Mountain, Green Hill, the trail to Commissary Ridge, select NHT segments, riparian and wetland areas, and special status plant species populations to motor vehicle use and OHV use. Alternative D opens 80 acres in the former Chariot Race area, east of Lyman, and 60 acres in the Hill Climb area to OHV use. The existing 23 miles of groomed snow machine trails in the planning area remain open under Alternative D and new trails are considered on a case-by-case basis. Snow machine use under Alternative D is not allowed in the Raymond Mountain WSA.

2.4.4.4 Special Designations

Under Alternative D, the existing Raymond Mountain WSA and ACEC are retained, ACECs for special status plant species habitat and cushion plant communities are considered on a case-by-case basis, the Bridger Butte ACEC is designated, and the Rock Creek/Tunp and Bear River Divide MAs are established (Table 2-2). Alternative D also recommends two waterway segments for inclusion in the National Wild and Scenic Rivers system and designates the Emigrant Springs Back Country Byway. Compared to Alternative A, Alternative D retains existing designations and recommends two water segments as suitable for inclusion in the WSR system, two MAs, one Back Country Byway, and one ACEC. Two additional ACECs are considered on a case-by-case basis. The additional designations under Alternative D conserve physical, biological, and heritage resources more and constrain resource uses more compared to Alternative A.

2.5 Details of Alternatives

Table 2-3 identifies goals and objectives, management actions common to all alternatives, and management actions by alternative. These are arranged according to the resource topics below.

Number	Resource Topic
1000	Physical Resources (PR)
2000	Mineral Resources (MR)
3000	Fire and Fuels Management (FM)
4000	Biological Resources (BR)
5000	Heritage Resources (HR)
6000	Land Resources (LR)
7000	Special Designations (SD)
8000	Socioeconomic Resources (SR)

The above numbering system and abbreviations for each of the eight resource topics appear as headings and serve to organize this table. Following the headings are the applicable goals and objectives for each resource topic. These goals and objectives apply to all four alternatives under consideration for the entire planning area and would apply for the life of the RMP.

Management actions are anticipated to achieve the goals and objectives identified for each resource topic. Some management actions are constant across all alternatives, whereas others vary by alternative. Management actions that apply to all alternatives are listed for each resource topic under the heading *Management Actions Common to All Alternatives* immediately following the goals and objectives for each resource topic. Management actions that vary by alternative are listed under the heading *Management Actions by Alternative.* If the action is general in nature, it is listed under the resource topic heading (e.g., physical resources, biological resources, etc.). In general, if the action is more specific, it is listed under the individual resource (e.g., wildlife) or in some cases, the resource subcategory (e.g., big game).

The following apply under all alternatives:

- *Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities* (see Appendix N)
- *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (www.blm.gov/wy/st/en/programs/grazing/standards_and_guidelines.html)
- Best Management Practices (see Appendix O)

Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP. For example, areas identified as administratively unavailable for oil and gas leasing refer to the life of the RMP unless changed through an RMP amendment and public involvement. Moreover, where seasonal or other restrictions or limitations are placed on development, exception, waiver, or modification of these limitations may be approved in writing, including documented supporting analysis, by the authorized officer. This applies to all restrictions and limitations. All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.

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Table 2-3. Detailed Table of Alternatives

MANAGEMENT GOALS COMMON TO ALL RESOURCES AND ALTERNATIVES
The BLM Kemmerer Field Office will: • Manage the public lands within the requirements of all applicable federal laws. • Manage the public lands within the requirements of all current and applicable federal policy and guidance. • Use cooperative consultation with all applicable state and local governments to aid in effective cross-jurisdictional management of land and resources. • Manage public land resources and resource uses in consideration of all other resource values of the applicable lands. • Manage public land resources within the natural variations and capability of the applicable lands. • Manage the public lands in the spirit of Communication, Consultation, and Cooperation, all in the service of Conservation. • Conduct appropriate project level NEPA analysis and make considerations for levels of analyzed impacts. • Provide educational opportunities to the public regarding public lands and the resources that exist on those lands. • Manage resources to contribute to the economic stability of local communities. • Require on-site mitigation to implement actions under the conditions of the RMP. • Encourage compensatory (off-site) mitigation on a voluntary basis to offset the impacts of projects or actions and to better accommodate other uses temporarily displaced. • Manage vegetation, soil, landform, water quality, and air quality to maintain, meet, or make substantial progress towards meeting the Wyoming Standards for Healthy Rangelands. • Apply chemicals in accordance with label instructions.

Table 2-3. Detailed Tables of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		8841000 PHYSICAL RESOURCES (PR) - AIR QUALITY			
		GOAL PR:1 Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules, and regulations. **Objectives:** **PR:1.1** Maintain concentrations of criteria pollutants associated with management actions in compliance with applicable state and federal AAQS. **PR:1.2** Maintain concentrations of PSD pollutants associated with management actions in compliance with the applicable increment. **GOAL PR:2** Implement management actions within the scope of the BLM's land-management responsibilities to improve air quality as practicable. **Objectives:** **PR:2.1** Reduce visibility-impairing pollutants in accordance with the reasonable progress goals and timeframes established within the State of Wyoming's Regional Haze SIP. **PR:2.2** Reduce atmospheric deposition levels below generally accepted LOCs and LACs.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
1001	PR:1 PR:2	Work cooperatively to develop an Air Quality Assessment Protocol to estimate potential future air quality.			
1002	PR:1	Manage prescribed burns to comply with Wyoming DEQ AQD smoke-management rules and regulations.			
1003	PR:1	Establish within 1 year of approval of the RMP ROD, an air quality strategy to define the background air quality associated with federal actions approved under this RMP.			
1004	PR:1	Create and maintain within 1 year of establishing the air quality strategy, a monitoring system to establish the air quality change over time related to federal actions.			
1005	PR:1 PR:2	Work cooperatively to encourage industry and other permittees to adopt measures to reduce emissions.			
1006	PR:1 PR:2	Work cooperatively to estimate potential impacts from potential emission reduction.			
1007	PR:1 PR:2	Ensure that the level of air quality analysis is proportional to the availability of emissions information and public concern for air quality.			
1008	PR:1 PR:2	Perform dispersion-modeling analyses to determine the potential impacts of proposed air emission mitigations.			

Table 2-3. Detailed Table of Alternatives (Continued)

1000 PHYSICAL RESOURCES (PR) - AIR QUALITY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
1009	PR:1 PR:2	Maintain existing ambient air quality and AQRV monitoring.	Enhance existing criteria pollutant and AQRV monitoring. Locations of AQRV monitors will be determined through a cooperative process. Suggest Wyoming DEQ AQD consider adding new criteria pollutant monitors.	Same as Alternative A.	Enhance existing criteria pollutant and AQRV monitoring on a project-specific or as-needed basis. Locations of AQRV monitors will be determined through a cooperative process. Suggest Wyoming DEQ AQD consider adding new criteria pollutant monitors.
1010	PR:1 PR:2	Utilize cooperative process that shares information on proposed emission sources and air quality issues to the public and government agencies, such as the Wyoming DEQ AQD, EPA, USFS, and NPS.	Enhance the existing cooperative process that shares air quality information with agencies, stakeholders, and the public.	Same as Alternative B.	Same as Alternative B.
1011	PR:1 PR:2	Allow air quality impacts up to applicable standards and guidelines. The FLPMA and the Clean Air Act prohibit the BLM from conducting, supporting, approving, licensing, or permitting any activity under its jurisdiction that does not comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, and implementation plans. A program has been developed that provides benefits to air quality and other resources by decreasing air pollutant concentrations, increasing visibility, and decreasing atmospheric depositions. The BLM works closely with the Wyoming DEQ AQD to ensure that the BLM's prescribed fire actions comply with applicable smoke-management regulations.	Consider implementing mitigations within BLM's authority to reduce emissions from current levels in the planning area. Facilitate discussions with stakeholders to implement mitigations beyond the BLM's authority to reduce emissions from current levels in the planning area, such as: Consider a program to offset emissions proposed by the RMP. Reduce emissions from existing sources (by techniques such as more stringent Best Available Control Technologies).	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		1000 PHYSICAL RESOURCES (PR) – SOIL			
		Goal PR:3 Maintain or improve soil health (chemical, physical, and biotic properties) and prevent or minimize soil erosion and compaction. **Objectives:** **PR:3.1** Monitor and evaluate the effectiveness of management practices and (or) treatments applied to protect water and soil resources within the planning area. **PR:3.2** Utilize best available science, such as soil management and salinity reduction methods and (or) appropriate predictive models (e.g., WEPP, RUSLE, or MUSLE) to ensure that accelerated soil erosion from BLM actions and permitted activities is minimized. **Goal PR:4** Prevent or limit soil loss and control sediment transport to receiving waters by identifying, developing, interpreting, and utilizing soil information in management actions. **Objectives:** **PR:4.1** Monitor and evaluate the effectiveness of management practices and (or) treatments applied to protect water and soil resources within the planning area. **PR:4.2** Utilize best available science, such as soil management and salinity reduction methods and (or) appropriate predictive models (e.g., WEPP, RUSLE, or MUSLE) to ensure that accelerated soil erosion from BLM actions and permitted activities is minimized.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
1012	PR: 3 PR:4	Pursue and support the completion of Level III soil surveys throughout the planning area.			
1013	PR:3.2 PR:4.2	Emphasize the reduction of soil erosion, sediment, and salinity contributions to the Green and Bear River basins throughout the planning area, with a focus on areas with high saline soils and sensitive soils, through management actions.			
1014	PR:3.2 PR:4.2	Avoid surface disturbance when conditions exist that will accelerate or cause soil and (or) watershed damage.			
1015	PR:3.2 PR:4.2	Require interim reclamation on well locations and similar disturbed soils to improve stability and infiltration.			
1016	PR:3.2 PR:4.2	Salvage a minimum of 6 inches of topsoil on all surface-disturbing activities unless the physical and (or) chemical properties of the soil are such that salvage of that amount of topsoil should not be required.			
1017	PR:3.1 PR:3.2 PR:4.1 PR:4.2	Develop and implement rehabilitation plans on newly disturbed areas and for existing disturbances, as needed.			
1018	PR:3.1 PR:3.2 PR:4.1 PR:4.2	Require follow-up seeding and (or) corrective erosion-control measures on areas of surface disturbance that experience reclamation failure.			
1019	PR:3.2 PR:4.2	Apply best management practices (i.e., silt fences, erosion blankets, etc.) in all areas to limit soil erosion and related undesirable conditions, with additional emphasis in areas with sensitive soil characteristics, including, but not limited to, the following: badlands, saline bottomlands, sodic, high pH, calcareous, and highly erodible.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

1000 PHYSICAL RESOURCES (PR) – SOIL					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
1020	PR:3.1 PR:3.2 PR:4.1 PR:4.2	Utilize completed soil surveys and site observations to address soil protection and mitigations necessary to minimize damage to soils.	Require soil survey and (or) analysis on all proposals for surface-disturbing activities within the planning area.	Same as Alternative A.	Same as Alternative A.
1021	PR:3.2 PR:4.2	Comply with current standard practices for surface-disturbing activities and the Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Restrict oil- and gas-related activities on slopes greater than 25 percent. No surface occupancy on slopes greater than 40 percent.	Same as Alternative A, except comply with the following management actions for surface-disturbing activities within areas of highly erosive, fragile, and (or) nonproductive soils: (1) Prohibit surface-disturbing activities in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate soil mitigation developed for site-specific erosion control. (2) Ensure protection of the Green River and Bear River sub-basins from increased erosion and sedimentation. (3) Prohibit disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics.	Same as Alternative A.	Same as Alternative A, except comply with the following management actions for surface-disturbing activities within areas of highly erosive, fragile, and (or) nonproductive soils: (1) Avoid surface disturbance on slopes of 20 percent or greater on sensitive soil types. Disturbance of slopes greater than 20 percent requires additional consideration of slope stabilization and erosion control techniques. (2) Ensure protection of the Green River and Bear River sub-basins from increased erosion and sedimentation. (3) Avoid disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics. Disturbance of soils of these types requires erosion, revegetation, and restoration plans.
1022	PR:3.2 PR:4.2	Reclamation of surface disturbance, including recontouring and seeding to re-establish healthy native plant communities based on preexisting composition (where possible) to begin within 1 year of the abandonment of operations.	Topsoil piles would be seeded or erosion control devices installed on all surface disturbances within 6 months of the initial disturbance. Topsoil piles left exposed longer than 1 year would be no greater than 4 feet deep and seeded with cover crop seed mixes for soil stabilization and maintenance of soil health. Interim and (or) final reclamation will be required within 1 year of completion of drilling activities.	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

		1000 PHYSICAL RESOURCES (PR) – WATER			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal PR:5 Maintain compliance with applicable federal and state water quality standards and improve water quality, where practical, within the scope of the BLM's authority. **Objectives:** **PR:5.1** Protect and improve groundwater quality and quantity through appropriate measures (e.g., predictive modeling, monitoring, and protection of known water recharge areas) during BLM activities and permitted actions over the life of the plan. **PR:5.2** Take appropriate actions within State of Wyoming established timeframes to control all causes of impairment and prevent additional listings of impaired waterbodies resulting from BLM actions and permitted activities on watersheds (including, but not limited to, those that contain 303d listed streams, Class 1 waters, Colorado River system streams, and critical watersheds). **PR:5.3** Coordinate with appropriate entities to rehabilitate or reclaim functionally compromised reservoirs on BLM-administered surface. **PR:5.4** Prevent accelerated channel erosion and adjustments in channel geometry (e.g., width-depth ratio, sinuosity, bank stability, gradient, location of headcuts, and rate of migration) of stream channels as a result of BLM-permitted activities. **PR:5.5** Improve important geomorphic parameters (e.g., width to depth ratio, percent eroding bank) where these parameters are impacted by federal actions or are in areas important for water quality. **Goal PR:6** Maintain or reestablish proper watershed function to support natural or desired surface water flow regimes. **Objectives:** **PR:6.1** Protect and improve groundwater quality and quantity through appropriate measures (e.g., predictive modeling, monitoring, and protection of known water recharge areas) during BLM activities and permitted actions over the life of the plan. **PR:6.2** Take appropriate actions within State of Wyoming established timeframes to control all causes of impairment and prevent additional listings of impaired waterbodies resulting from BLM actions and permitted activities on watersheds (including, but not limited to, those that contain 303d listed streams, Class 1 waters, Colorado River system streams, and critical watersheds). **PR:6.3** Coordinate with appropriate entities to rehabilitate or reclaim functionally compromised reservoirs on BLM-administered surface. **PR:6.4** Prevent accelerated channel erosion and adjustments in channel geometry (e.g., width-depth ratio, sinuosity, bank stability, gradient, location of headcuts and rate of migration) of stream channels as a result of BLM permitted activities. **PR:6.5** Improve important geomorphic parameters (e.g., width to depth ratio, percent eroding bank) where these parameters are impacted by federal actions or are in areas important for water quality. **Goal PR:7** Provide for availability of water to support uses authorized on federal lands, where appropriate. **Objectives:** **PR:7.1** Protect and improve groundwater quality and quantity through appropriate measures (e.g., predictive modeling, monitoring, and protection of known water recharge areas) during BLM activities and permitted actions over the life of the plan. **PR:7.2** Take appropriate actions within State of Wyoming established timeframes to control all causes of impairment and prevent additional listings of impaired waterbodies resulting from BLM actions and permitted activities on watersheds (including, but not limited to, those that contain 303d listed streams, Class 1 waters, Colorado River system streams, and critical watersheds). **PR:7.3** Coordinate with appropriate entities to rehabilitate or reclaim functionally compromised reservoirs on BLM-administered surface. **PR:7.4** Prevent accelerated channel erosion and adjustments in channel geometry (e.g., width-depth ratio, sinuosity, bank stability, gradient, location of headcuts and rate of migration) of stream channels as a result of BLM permitted activities. **PR:7.5** Improve important geomorphic parameters (e.g., width to depth ratio, percent eroding bank) where these parameters are impacted by federal actions or are in areas important for water quality.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

1000 PHYSICAL RESOURCES (PR) – WATER					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES					
1023	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.3 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.3 PR:7.4 PR:7.5	Address nonpoint source pollution by maintaining and (or) improving channel geomorphology and vegetative structure of surface water features and controlling dust and other nonpoint sources on BLM activities and permitted actions.			
1024	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.3 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.3 PR:7.4 PR:7.5	Require proper disposal of water produced by oil and gas, including water produced by unconventional gas development.			
1025	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.3 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.3 PR:7.4 PR:7.5	Comply with all federal, state, and local laws and regulations regarding the management and (or) disposal of waters produced by mineral developments.			
1026	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.3 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.3 PR:7.4 PR:7.5	Cooperate with the state as it develops source water and wellhead protection plans to protect drinking water sources.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

1000 PHYSICAL RESOURCES (PR) – WATER					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
1027	PR:5.1 PR:5.2 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.4 PR:7.5	Enforce measures, such as avoiding highly erosive areas, implementing zero runoff programs on large-scale disturbances, and reclaiming all abandoned surface disturbances. Watersheds in the Green River Basin will be sampled to identify salinity problems. Actions with the potential to create surface disturbance will be designed for minimal erosion, as far as practical, to comply with the Colorado River Basin Salinity Control Act of 1974.			
1028	PR:5.2 PR:5.4 PR:5.5 PR:6.2 PR:6.4 PR:6.5 PR:7.2 PR:7.4 PR:7.5	Incorporate requirements and methodology for achieving watershed improvement into activity plans, as necessary. Priority areas include all streams listed on the updated Clean Water Act 303(d) list and areas that have failed to meet Standard #2 of the Standards and Guidelines the BLM will coordinate with state agencies and local governments (e.g., watershed planning committees) on all 303(d) listed stream segments.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
1029	FR:1.1 FR:1.2 FR:1.3	Use of fire suppression chemicals, including foaming agents and surfactants, is not allowed within 200 feet of surface water.	Use of fire suppression chemicals, including foaming agents and surfactants, is not allowed within 500 feet of surface water.	Use of fire suppression chemicals, including foaming agents and surfactants, is allowed throughout the planning area.	Same as Alternative A.-
1030	PR:5.2 PR:5.4 PR:5.5 PR:6.2 PR:6.4 PR:6.5 PR:7.2 PR:7.4 PR:7.5	No similar action.	Design land use and surface-disturbing activities to reduce channel erosion, specifically bank erosion and channel incision, which result in loss of riparian habitats and accelerate surface erosion. Restore damaged wetlands.	Same as Alternative B.	Same as Alternative B.
1031	PR:5.2 PR:5.4 PR:5.5 PR:6.2 PR:6.4 PR:6.5 PR:7.2 PR:7.4 PR:7.5	On a case-by-case basis, activity plans are prepared to reduce phosphate, sediment, and salt loading to downstream waterbodies.	Design activity and (or) project plans to reduce phosphate, sediment, and salt loading to downstream waterbodies, including Bear Lake and the Flaming Gorge Reservoir.	Same as Alternative A.	Same as Alternative B.
1032	PR:5.2 PR:5.4 PR:5.5 PR:6.2 PR:6.4 PR:6.5 PR:7.2 PR:7.4 PR:7.5 BR:2.1	The area within 500 feet of or within wetlands, riparian areas, aquatic habitats, and 100-year floodplains are avoidance areas for surface-disturbing activities.	The area within ¼ mile of or within wetlands, riparian areas, aquatic habitats, and 100-year floodplains would be exclusion areas for surface-disturbing activities.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

1000 PHYSICAL RESOURCES (PR) – WATER					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
1033	PR:5.2 PR:5.4 PR:5.5 PR:6.2 PR:6.4 PR:6.5 PR:7.2 PR:7.4 PR:7.5 BR:2.1	No new permanent facilities are allowed in floodplains, riparian areas, or wetlands, except to benefit watershed health or vegetation. Linear watercourse crossings are considered on a case-by-case basis.	No new permanent facilities, including road crossings, are allowed in floodplains, riparian areas, or wetlands. All linear underground facilities crossing watercourses are bored.	New permanent facilities are allowed in floodplains, wetlands, and riparian areas, provided there are no practicable alternatives and sufficient mitigation is undertaken so that the action will meet the requirements of EOs 11988 and 11990. Linear watercourse crossings are considered on a case-by-case basis.	No new permanent facilities are allowed in riparian areas or wetlands unless they (1) meet the requirements and intent of EOs 11988 and 11990, (2) there are no practicable alternatives, and (3) appropriate mitigation measures are implemented. Linear watercourse crossings are considered on a case-by-case basis.
1034	PR:5.1 PR:5.2 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.4 PR:7.5	Requirements for the lining of reserve pits are determined on a case-by-case basis. Lined pits, barrier walls, or closed mud systems may be utilized, as necessary.	Line all reserve pits. Closed mud systems are the preferred method.	Same as Alternative A.	Line all reserve pits unless other more effective methods (i.e., barrier walls, closed mud systems) are needed to prevent infiltration and adverse impacts to groundwater and other resources.
1035	PR:5.1 PR:5.2 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.4 PR:7.5	Maintain aquifer recharge areas on a case-by-case basis.	Maintain aquifer recharge areas to protect groundwater and surface water quality through maintenance of the vegetative cover and soil structure that contributes to recharge and limitations to surface-disturbing activities.	Same as Alternative A.	Maintain identified aquifer recharge areas to protect groundwater and surface water quality through maintenance of the vegetative cover and soil structure that contributes to recharge.
1036	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:5.5 PR:6.1 PR:6.2 PR:6.3 PR:6.4 PR:6.5 PR:7.1 PR:7.2 PR:7.3 PR:7.4 PR:7.5	All federal CBNG well APDs are subject to the standard APD reviews. Water disposal (including, but not limited to, underground injection, discharge into streams, evaporation ponds, infiltration ponds, etc.) is reviewed for meeting all local, state, and federal laws and regulations. No water surface disposals, evaporation ponds, underground injection, or infiltration ponds will be allowed without proper state and federal permits. Appropriate NEPA evaluations are completed at each stage of development.	Prohibit disposal of produced waters to streams or other flow-connected surface features. Prohibit disposal of produced waters to public land uplands.	Same as Alternative A.	Same as Alternative A, except proposed disposal of produced water to streams or other flow-connected surface features on public lands requires a BLM approved disposal plan (Appendix D). Disposal of produced water to public land uplands is considered on a case-by-case basis as long as the applicant can demonstrate that a beneficial use of the water will result. Disposal of produced water to public land uplands requires a BLM-approved disposal plan (Appendix D).

Table 2-3. Detailed Table of Alternatives *(Continued)*

		2000 MINERAL RESOURCES (MR) Note: All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal MR:1 Provide opportunities for developing mineral resources on available public lands. **Objectives:** **MR:1.1** Provide opportunities for exploring, selling and (or) permitting, and developing salable minerals. **MR:1.2** Allow locations of mining claims to explore for and develop locatable minerals, except in withdrawn areas. **MR:1.3** Provide opportunities for exploring, leasing, and developing conventional and unconventional oil and gas, CBNG, coal, sodium, phosphate, and other leasable minerals, including, but not limited to, oil shale and geothermal.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
2001	MR:1.1 MR:1.2 MR:1.3	Collecting surface rock in commercial quantities requires a mineral material contract. Operations are evaluated on a case-by-case basis.			
2002	MR:1.3	Allow for geophysical exploration on unleased lands throughout the planning area subject to identified conditions of approval.			
2003	MR:1.2	Open the planning area for locatable mineral entry, with the exception of some withdrawn areas.			
2004	MR:1.1	Areas that contain known deposits of oil shale are available for oil shale lease consideration where it is not inconsistent with existing laws and regulations, EOs, and ACECs. Oil shale leasing will not be considered in areas where it would jeopardize the safe operation of existing trona mines.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		LOCATABLE			
2005	MR:1.2 BR:2.8 BR:2.9 HR:3 LR:5.3	Some lands within the planning area are currently withdrawn from locatable mineral entry. The withdrawals are primarily for protection of oil shale, coal, and phosphate resources.	Same as Alternative A, except withdraw the following areas from operation of the mining laws: Developed campgrounds (3 acres). The federal section that contains Bridger Antelope Trap (640 acres). Areas with special status plant and wildlife species (acreage unknown). Cokeville Meadows National Wildlife Refuge (3,056 acres).	Initiate procedures to lift existing locatable mineral withdrawals in the planning area. No new withdrawals are considered, except for Cokeville Meadows National Wildlife Refuge (3,056 acres).	In addition to existing withdrawals, withdraw the following area from operation of the mining laws: Developed campgrounds (32 acres). The federal section that contains Bridger Antelope Trap (640 acres). Areas with special status plant species (886 acres of federal mineral estate). Cokeville Meadows National Wildlife Refuge (3,056 acres).

Table 2-3. Detailed Table of Alternatives *(Continued)*

		2000 MINERAL RESOURCES (MR) Note: All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		LEASABLE - OIL AND GAS INCLUDING CBNG			
2006	MR:1.3	Approximately 261,564 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form only.	Approximately 13,796 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form only.	Approximately 265,414 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form only.	Approximately 64,171 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form only.
2007	MR:1.3	Approximately 844,554 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as moderate constraints.	Approximately 103,704 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as moderate constraints.	Approximately 860,249 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as moderate constraints.	Approximately 1,042,502 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as moderate constraints.
2008	MR:1.3	Approximately 368,427 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as major constraints.	Approximately 751,804 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as major constraints.	Approximately 348,882 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as major constraints.	Approximately 290,973 acres of federal mineral estate are administratively available to oil and gas leasing subject to the terms and conditions of the standard lease form, as well as major constraints.
2009	MR:1.3 BR:3-5.5 BR:3-5.6 SR:2.1	Approximately 104,817 acres of federal mineral estate are administratively unavailable for oil and gas leasing.	Approximately 710,058 acres of federal mineral estate are administratively unavailable for oil and gas leasing.	Approximately 104,817 acres of federal mineral estate are administratively unavailable for oil and gas leasing.	Approximately 181,716 acres of federal mineral estate are administratively unavailable for oil and gas leasing.
2010	MR:1.3	Fluid mineral leasing is allowed on areas within potential habitats for federally listed species.	New fluid mineral leasing is not allowed on unleased areas within potential habitats for federally listed species. Expired leases in these areas are not reoffered.	Same as Alternative A.	Same as Alternative A.
2011	MR:1.3	Fluid mineral leasing is allowed in areas containing high management level trail segments.	New fluid mineral leasing is not allowed on unleased areas within 5 miles of high-level management trail segments. Expired leases within 5 miles of high management level trail segments are not reoffered.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		2000 MINERAL RESOURCES (MR) Note: All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.			
2012	MR:1.3 SR:2.1	Existing oil and gas leases are suspended in the MMTA; new oil and gas leases are not being issued in the MMTA.	Same as Alternative A, except permanently close the MMTA to new fluid mineral leasing.	Same as Alternative A, except the MMTA is administratively unavailable for new fluid mineral leasing until the oil and gas resource can be recovered without compromising the safety of underground miners.	Same as Alternative C.
2013	MR:1.3	Fluid mineral leasing is allowed in areas containing areas set aside specifically for public recreation purposes.	New fluid mineral leasing is not allowed on areas set aside specifically for public recreation purposes.	Same as Alternative A.	Areas set aside specifically for public recreation purposes would be administratively unavailable for oil and gas leasing.
		LEASABLE - COAL			
2014	MR:1.3	Process LBAs for new coal leases outside the Raymond Mountain WSA by applying the coal screening process to the application. If any of the existing RMP (BLM 1986a) coal-screening management decisions are current and relevant to the application area, they will be applied.	No new coal leasing is considered in the planning area.	Process new coal lease applications by using the coal screening process. Federal land within the proposed Haystack project area is determined acceptable for further consideration for coal leasing and development.	Same as Alternative C.
		LEASABLE - SODIUM			
2015	MR:1.3	All public lands (outside of the Raymond Mountain WSA) within the planning area are available for sodium leasing consideration. Exploration for sodium will be considered on a case-by-case basis. Limited surface occupancy criteria contained in the Sodium Mineral Development Environmental Assessment will be applied on a case-by-case basis.	Same as Alternative A, except no new sodium exploration and leasing is authorized within the viewshed of the Fossil Butte National Monument or within the viewsheds of incorporated towns and cities.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

		2000 MINERAL RESOURCES (MR) Note: All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
2016	MR:1.3	No new sodium leases or exploration licenses may be issued on lands within the Raymond Mountain WSA. This applies to public lands, including split-estate lands where federal mineral estate underlies nonfederal surface, within the boundaries of the WSA.	Close areas with special status plant and wildlife species to sodium mineral development.	Same as Alternative A.	Same as Alternative A.
		LEASABLE - OTHER SOLID LEASABLES (PHOSPHATE)			
2017	MR:1.3	All public lands (outside of the Raymond Mountain WSA) within the planning area are available for phosphate leasing consideration. Exploration for phosphate will be considered on a case-by-case basis.	Same as Alternative A, except no new phosphate exploration and leasing is authorized within the viewshed of the Fossil Butte National Monument or within the viewsheds of incorporated towns and cities. Close areas with special status plant and wildlife species to phosphate mineral development.	Same as Alternative A.	Same as Alternative A.-
		SALABLE			
2018	MR:1.1	Subject to the waiver requirements in 43 CFR 3601.14 on unpatented mining claims, the planning area is available for consideration of mineral materials sales and (or) free use permits.	Same as Alternative A, except, no mineral material sales and (or) free use permits are authorized within the Raymond Mountain WSA (32,880 acres).	Same as Alternative A.	Same as Alternative B.
2019	MR:1.1	The area within the viewshed of the Fossil Butte National Monument is available for consideration of mineral materials sales and (or) free use permits.	The area within the viewshed of the Fossil Butte National Monument is not available for mineral material sales and (or) free use permits.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

		2000 MINERAL RESOURCES (MR) Note: All withdrawal actions (including mineral withdrawals) are processed in the lands and realty program.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
2020	MR:1.1	Developed campground areas are available for mineral material sales and (or) free use permits.	No mineral material sales and (or) free use permits are authorized within ½ mile of developed campgrounds.	Same as Alternative A.	Same as Alternative B, unless impacts to campground users are minimal.
2021	MR:1.1	Mineral material sales and (or) free use permits can be authorized in areas with special status plant or wildlife species on a case-by-case basis.	No mineral material sales and (or) free use permits are authorized in areas with special status plant or wildlife species.	Same as Alternative A.	Same as Alternative A, except no mineral materials sales and (or) free use permits in actual special status plant species locations.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		3000 FIRE AND FUELS MANAGEMENT (FR)			
		Goal FR:1 Protect human health and safety and resources at risk using fire suppression. **Objectives:** **FR:1.1** Ensure the health and safety of communities and the return of healthy ecosystems after wildfire events. **FR:1.2** Implement appropriate fire suppression techniques. **FR:1.3** Minimize disturbances to other resources resulting from fire suppression activities on public lands. **FR:1.4** Suppress wildland fires in identified priority areas, including those in wildland-urban and industrial interface areas adjacent to private lands and in the areas of campgrounds and significant cultural sites (see Glossary). **FR:1.5** Reduce hazardous fuels and implement fuels projects where resources are at risk such as wildland, urban and industrial interfaces, areas adjacent to private lands, campgrounds, and significant cultural sites. **Goal FR:2** Reduce or modify hazardous fuel accumulations through fuels management. **Objectives:** **FR:2.1** Reduce hazardous fuels and focus fuels projects where resources are at risk, such as wildland, urban and industrial interfaces, areas adjacent to private lands, campgrounds, and significant cultural sites. **FR:2.2** Implement and maintain a current fire management plan for the Kemmerer Field Office planning area that addresses all issues associated with fire and fuels management for the planning area. **Goal FR:3** Restore natural fire regimes and frequency to the landscape, where appropriate. **Objective:** **FR:3.1** Implement and maintain a current fire management plan for the planning area, which addresses all issues associated with fire and fuels management for the planning area that includes a focus on restoring natural fire regimes and frequency on the landscape. **FR:3.2** In an effort to mimic natural fire regimes and return intervals, move from condition class 3 to condition classes 1 and 2 using fire management and vegetative treatments.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
3001	FR:2.2 FR:3.1	Ensure all prescribed burning activities are in compliance with, and meet all state and federal air quality standards.			
3002	FR:1.1 FR:1.3 FR:2.2 FR:3.1	Implement the BLM Emergency Stabilization and Rehabilitation standards located in the Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook on wildland fires to protect and sustain healthy ecosystems and protect life and property.			
3003	FR:1.1 FR:1.2 FR:1.3 FR:1.4 FR:2.2 FR:3.1	Base wildland fire suppression techniques on the AMR in an approved fire management plan for the planning area and consider cost benefits based on resources at risk.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

3000 FIRE AND FUELS MANAGEMENT (FR)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
3004	FR:1.1 FR:1.2 FR:1.3 FR:1.4 FR:2.2 FR:3.1	Wildland fire suppression: AMR in Fire Management Plan is followed for areas identified where fire is not desired, or in areas where fire can be used as a management tool.	Same as Alternative A.	Suppress all wildland fires in the planning area.	In areas of high-density urban and (or) industrial interface with intermingled BLM-administered lands, suppression objectives will follow the AMR in an approved fire management plan for the planning area to provide first for human health and safety, while minimizing loss of property and threats to other surface owners. Generally, wildland fires are suppressed in these areas. In areas of low-density urban and (or) industrial interface where BLM-administered lands occur in large contiguous blocks, fire suppression objectives will follow the AMR in an approved fire management plan for the planning area to provide first for human health and safety, while allowing for achievement of resource objectives.
3005	FR:1.1 FR:1.2 FR:1.3 FR:2.2 FR:3.1	During fire suppression activities, limit soil disturbance from heavy equipment to protect cultural and natural resources.	During suppression activities in the planning area soil disturbance on public lands is not allowed without consent from a Kemmerer Field Office authorized officer (per an approved fire management plan for the Kemmerer Field Office).	No soil disturbance is allowed within the planning area from heavy equipment during suppression unless private or public habitable structures or industrial facilities are at risk.	Same as Alternative B.
3006	FR:2.1 FR:2.2 FR:3.1	Prescribed fire, wildland fire use, chemical, biological, and mechanical treatments can be used to meet fire and fuels management objectives, and to improve plant community health and meet other resource objectives.	Same as Alternative A, except management objectives are met based on acreage thresholds and areas found in an approved fire management plan for the planning area.	Prescribed fire, wildland fire use, chemical, mechanical, and biological treatments are not considered in meeting fire and fuels management objectives.	Same as Alternative B.
3007	FR:2.1 FR:2.2 FR:3.1	Prescribed fire, wildland fire use, as well as chemical, biological, and mechanical treatments can be used to reduce hazardous fuels in areas of resources at risk.	Same as Alternative A.	Prescribed fire, wildland fire use, chemical, mechanical and biological treatments are not considered in reducing hazardous fuels.	Same as Alternative A.
3008	FR:2.2 FR:3.1 FR:3.2	Prescribed fire and wildland fire use can be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives.	Same as Alternative A, except management objectives are met based on acreage thresholds as found in an approved fire management plan for the planning area.	Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – GOALS AND OBJECTIVES

Goal BR:1 Manage vegetation communities to restore, maintain, or enhance vegetation community health, composition, and diversity and to provide a mix of natural successional stages that incorporate diverse structure and composition into each vegetation type.

Objectives:

BR:1.1 Manage or restore habitat on BLM-administered lands within the planning area to facilitate the conservation, recovery and maintenance of populations of native, desirable nonnative, and special status plant species (BLM sensitive species, USFWS listed, proposed, or petitioned species) consistent with appropriate local, state, and federal management plans.

BR:1.2 Manage specific environmental hazards, risks, and impacts in a manner compatible with special status plant species health.

BR:1.3 Manage for healthy native plant communities by reducing, preventing expansion of, or eliminating the occurrence of invasive, nonnative species, undesirable, non-native, or noxious weeds (predatory plant pests or disease) by implementing management actions consistent with goals included in "Partners Against Weeds" and consistent with weed management plans.

BR:1.4 Forestland would provide a sustainable supply of forest products to the public and commercial uses and up to 19,008 acres of forestland would be available for forest management actions. Woodlands would supply forest products to the public as a by-product with forest health, landscape restoration, and reduction of forest fuels objectives and up to 15,000 acres of woodland would be available for woodland management actions.

BR:1.5 Forestlands and woodlands within the Raymond Mountain WSA (3,000 acres) would be reserve managed to meet wilderness characteristics and healthy forest landscape objectives in accordance with management plans and IMP.

BR:1.6 Old growth management areas, and the connectivity of the old growth area, would be maintained as appropriate within forestlands and woodlands.

BR:1.7 Rangelands would provide a sustainable supply of forage for commercial uses on up to 1,411,071 acres in the planning area.

Goal BR:2 Manage riparian and wetland areas to provide the appropriate natural potential combination of vegetation, land form, or large woody debris to: (a) dissipate stream energy associated with high waterflows or energies associated with wind and (or) wave action and overland flow from adjacent sites, (b) reduce erosion and improve water quality, (c) filter sediment, (d) capture bedload, (e) allow for floodplain development, (f) improve flood-water retention and ground-water recharge, (g) develop root masses that stabilize stream banks, islands and shoreline features against cutting action, (h) allow for natural rates of water percolation, and (i) develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity.

Objective:

BR:2.1 Riparian areas should, within 10 years, have activity and implementation plans that will allow riparian areas to be maintained at or above, or continue to be improved toward, proper functioning condition.

Goal BR:3 Manage for the biological integrity and habitat function of terrestrial and aquatic ecosystems to sustain and optimize distribution and abundance of all native, desirable nonnative, and special status fish and wildlife species consistent with habitat capability.

Goal BR:4 Manage or restore forage vegetation and habitat on BLM-administered lands within the planning area to facilitate the conservation, recovery and maintenance of populations of native, desirable non-native, and special status species (BLM sensitive species, WGFD NSS 1-3 species, USFWS listed, proposed, or petitioned species) consistent with appropriate local, state, and federal management plans.

Goal BR:5 Provide quality habitats to support the expansion in range (i.e., introduction, reintroduction, augmentation, etc.) of identified high priority fish, wildlife, and plant species, as appropriate, on public lands in the planning area throughout the life of the plan.

Objectives for Goals 3, 4, and 5:

BR:3-5.1 Manage habitats to support WGFD in the attainment of big game herd unit objectives, fish management objectives, and well-distributed, healthy populations of wildlife and fish species consistent with the WGFD's Strategic Habitat Plan, Comprehensive Wildlife Conservation Strategy, and strategic population plans, and to achieve the stated purpose of designated Wildlife Habitat Management Areas.

BR:3-5.2 Ensure that no greater than 12.5 percent net loss of crucial habitat acres occurs in the planning area over the life of the plan in the absence of voluntary offsite mitigation.

BR:3-5.3 Maintain, restore, or enhance fisheries habitats in the planning area so they achieve optimal channel geomorphology and vegetative structure for productivity and biological diversity, and can achieve optimum conditions for desired fish populations during the life of the plan.

BR:3-5.4 Identify physical locations, potential conflicts, and other adverse impacts among fish and wildlife and other resources within the planning area and implement management actions and conservation measures to prevent and (or) reduce adverse impacts to desirable wildlife species.

BR:3-5.5 Inventory, map, and correlate vegetation types and seral stages within the planning area and develop and implement management actions to provide healthy and stable ecosystems that support wildlife habitat values, appropriate species' habitat needs, and the existing species' diversity.

BR:3-5.6 Capitalize on opportunities to maintain and enhance rangeland conditions and wildlife habitat capability and functionality, and provide adequate habitat, protection from disturbance, and barrier-free movements in identified wildlife migration routes and fish passages within the planning area.

BR:3-5.7 Manage for habitat necessary to support well-distributed healthy populations of special status fish and wildlife species by developing habitat management plans, other management documents, or other mechanisms as appropriate to conserve special status species.

BR:3-5:8 Strive for no net loss of crucial habitat function occurs in the planning area for any special status species.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – GOALS AND OBJECTIVES

Goal BR:6 Manage the direct, indirect, and cumulative adverse impacts to wildlife and their habitats such that no unnecessary or undue degradation results from BLM actions and authorized activities.

Objectives:

BR:6.1 Manage habitat to support WGFD in the attainment of their big game herd unit objectives, strategic population plans, the Strategic Terrestrial Plan and the Aquatic Habitat Plan, and to achieve the stated purpose of designated Wildlife Habitat Management Areas.

BR:6.2 Ensure that no greater than 12.5 percent net loss of crucial habitat acres occurs in the planning area over the life of the plan in the absence of voluntary offsite mitigation.

BR:6.3 Maintain, restore, or enhance fisheries habitats in the planning area so they achieve optimal channel geomorphology and vegetative structure for productivity and biological diversity, and can achieve optimum conditions for desired fish populations during the life of the plan.

BR:6.4 Coordinate with Wildlife Services prior to activities on the planning area to avoid non-target species mortalities and minimize disturbance to fish or wildlife during the life of the plan.

BR:6.5 Identify physical locations, potential conflicts, and other adverse impacts among fish and wildlife and other resources within the planning area and implement management actions and conservation measures to prevent and (or) reduce adverse impacts to desirable wildlife species.

BR:6.6 Inventory, map, and correlate vegetation types and seral stages within the planning area and develop and implement management actions to provide healthy and stable ecosystems that support wildlife habitat values, appropriate species' habitat needs, and the existing species' diversity.

BR:6.7 Capitalize on opportunities to maintain and enhance wildlife habitat capability and functionality, and provide adequate habitat, protection from disturbance, and barrier-free movements in identified wildlife migration routes and fish passages within the planning area.

Goal BR:7 Manage specific environmental hazards, risks, and impacts to fish, wildlife, and habitats in a manner compatible with native, desirable nonnative, and special status fish and wildlife health.

Objectives:

BR:7.1 Manage habitat to support WGFD in the attainment of their big game herd unit objectives, strategic population plans, the Strategic Terrestrial Plan and the Aquatic Habitat Plan, and to achieve the stated purpose of designated Wildlife Habitat Management Areas.

BR:7.2 Ensure that no greater than 12.5 percent net loss of crucial habitat acres occurs in the planning area over the life of the plan in the absence of voluntary offsite mitigation and ensure no net loss of crucial habitat function occurs in the planning area for any special status species.

BR:7.3 Maintain, restore, or enhance fisheries habitats in the planning area so they achieve optimal channel geomorphology and vegetative structure for productivity and biological diversity, and can achieve optimum conditions for desired fish populations during the life of the plan.

BR:7.4 Coordinate with Wildlife Services prior to activities on the planning area to avoid non-target species mortalities and minimize disturbance to fish or wildlife during the life of the plan.

BR:7.5 Identify physical locations, potential conflicts, and other adverse impacts among fish and wildlife and other resources within the planning area and implement management actions and conservation measures to prevent and (or) reduce adverse impacts to desirable wildlife species.

BR:7.6 Inventory, map, and correlate vegetation types and seral stages within the planning area and develop and implement management actions to provide healthy and stable ecosystems that support wildlife habitat values, appropriate species' habitat needs, and the existing species' diversity.

BR:7.7 Capitalize on opportunities to maintain and enhance wildlife habitat capability and functionality, and provide adequate habitat, protection from disturbance, and barrier-free movements in identified wildlife migration routes and fish passages within the planning area.

BR:7.8 Manage for habitat necessary to support well-distributed healthy populations of special status fish and wildlife species and develop habitat management plans, other management documents, or mechanisms as appropriate to conserve special status species.

Goal BR:8 Manage terrestrial and aquatic ecosystems to provide recreational and educational benefits and opportunities for the public.

Objectives:

BR:8.1 Manage habitat to support WGFD in the attainment of their big game herd unit objectives, strategic population plans, the Strategic Terrestrial Plan and the Aquatic Habitat Plan, and to achieve the stated purpose of designated Wildlife Habitat Management Areas.

BR:8.2 Ensure that no greater than 12.5 percent net loss of crucial habitat acres occurs in the planning area over the life of the plan in the absence of voluntary offsite mitigation.

BR:8.3 Maintain, restore, or enhance fisheries habitats in the planning area so they achieve optimal channel geomorphology and vegetative structure for productivity and biological diversity, and can achieve optimum conditions for desired fish populations during the life of the plan.

BR:8.4 Identify physical locations, potential conflicts, and other adverse impacts among fish and wildlife and other resources within the planning area and implement management actions and conservation measures to prevent or reduce adverse impacts to desirable wildlife species.

BR:8.5 Inventory, map, and correlate vegetation types and seral stages within the planning area and develop and implement management actions to provide healthy and stable ecosystems that support wildlife habitat values, appropriate species' habitat needs, and the existing species' diversity.

BR:8.6 Capitalize on opportunities to maintain and enhance wildlife habitat capability and functionality, and provide adequate habitat, protection from disturbance, and barrier-free movements in identified wildlife migration routes and fish passages within the planning area.

Goal BR:9 Forest resources would be managed to work toward restoring the forest landscape to historical early settlement period stocking level and structure/composition to meet forest health and reduction of forest fuels goals.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
4001	BR:1 BR:2	Manage vegetative communities in accordance with Wyoming Standards for Healthy Rangelands.			
4002	BR:3-5.1 BR:3-5.2 BR:3-5.3 BR:6.1 BR:6.2 BR:6.3 BR:7.1 BR:7.2 BR:7.3 BR:8.1 BR:8.2 BR:8.3	Choose and implement appropriate mitigation in a timely manner to minimize decreases in habitat function.			
4003	BR:3-5.1 BR:3-5.2 BR:3-5.3 BR:6.1 BR:6.2 BR:6.3 BR:6.4 BR:7.1 BR:7.2 BR:7.3 BR:7.4 BR:8.1 BR:8.2 BR:8.3	Mitigate impacts as close to the impact and for the same or similar impacted species or habitats as possible.			
4004	BR:3-5.1 BR:3-5.2 BR:6.1 BR:6.2 BR:7.1 BR:7.2 BR:8.1 BR:8.2	Utilize appropriate voluntary offsite compensatory mitigation to reduce impacts if necessary after all onsite mitigation has been accomplished or if onsite mitigation is not feasible.			
4005	BR:3-5.1 BR:3-5.2 BR:3-5.3 BR:3-5.4 BR:3-5.5 BR:3-5.6 BR:6.1 BR:6.2 BR:6.3 BR:6.5 BR:6.4 BR:6.6 BR:6.7 BR:5.1 BR:7.2 BR:7.3 BR:7.5 BR:7.4 BR:7.6 BR:7.7 BR:8.1 BR:8.2 BR:8.3 BR:8.4 BR:8.5 BR:8.6	Manage siting of facilities to minimize impacts on fish and wildlife habitat function and quality and to minimize fish and wildlife mortality during the life of the facility.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4006	BR:3-5.7 BR:3-5.2 BR:7.12 BR:7.13 BR:7.14	Identify distribution, key habitat areas, and special needs to develop management plans and conservation measures upon designation of threatened, endangered, and other special status species.			
4007	BR:3-5.7 BR:7.2 BR:3-5.2 BR:7.8	Assist authorized agencies in the restoration, reintroduction, augmentation, or re-establishment of threatened, endangered, and other special status species populations and (or) habitats.			
4008	BR:3-5.7 BR:3-5.2 BR:7.2 BR:7.8	Implement all appropriate conservation agreements, conservation measures, and BLM-endorsed management strategies for threatened, endangered, and other special status species. See Appendix A for current list.			
4009	BR:3-5.7 BR:3-5.2 BR:7.2 BR:7.8	Apply a "no surface occupancy" restriction to bald eagle winter roosting areas. In addition, a 1-mile buffer zone around bald eagle winter roost sites will be closed from November 1 through April 1. Activities and habitat alterations that may disturb bald eagles will be restricted within suitable habitats that occur within bald eagle buffer zones. Deviations may be made after consultation with the USFWS. Zone 1 (within 0.5 mile, year-round) is intended to protect active and alternative nests. For active nests, minimal human activity levels are allowed during the period of first occupancy to 2 weeks after fledging. Zone 2 (from 0.5 mile to 1 mile from the nest, February 1 to August 15) is intended to protect bald eagle primary use areas and permits light human activity levels. Zone 3 is designated to protect foraging and (or) concentration areas year-round 2.5 miles from the nest.			
4010	BR:3-5.7 BR:3-5.2 BR:3-5.4 BR:3-5.1 BR:6.5 BR:7.5 BR:7.8 BR:7.2	Apply a seasonal mountain plover protection stipulation from April 10 to July 10 to protect breeding and nesting habitats.			
4011	BR:7.1	An adaptive management approach will be followed to achieve the minimum goal of proper functioning condition on all riparian-wetland areas. Information gathered from assessments of riparian areas using the Proper Functioning Condition Assessment Methodology (Prichard 1998) will be used to identify attributes and processes that are not in a working order. Site-specific management strategies will be collaboratively designed and implemented to correct these. Monitoring will be conducted to identify any changes in management necessary to establish and maintain an upward trend. Based on this information, refinements in the management strategy will be implemented as necessary and monitoring continued. This iterative process provides the flexibility to ensure that management quickly and effectively responds to resource needs, thus ensuring that resource objectives can be met and maintained even in the face of seasonal, annual, and cyclic events such as fire, insect infestations, disease, weather, and associated hydrologic events that are beyond human control.			
4012	BR:3-5.1 BR:3-5.4	Avoid disruptive activity in big game crucial winter range November 15 to April 30.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – VEGETATION RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4013	PR:3.2 PR:4.2	Reestablish vegetation over disturbed soils within 3 years of initial seeding. If establishment is unsuccessful, follow-up seeding and soil nutrient testing will occur to determine if additional reclamation is necessary.	Reestablish healthy native plant communities based on preexisting composition or other species as identified in an approved management plan on disturbed soils within 3 years of initial seeding. If establishment is unsuccessful, implement follow-up seeding and soil nutrient testing to determine if additional reclamation is necessary.	Same as Alternative A.	Same as Alternative B.
4014	BR:1.1	Manage vegetation resources to comply with the ESA and BLM policy associated with management of special status species.	Manage large, contiguous blocks of federal land by maintaining or enhancing sagebrush, aspen, and mountain shrub communities. Maintain connections between these community types by managing projects to minimize construction disturbance to the smallest acreage possible with considerations for engineering feasibility and safety.	Same as Alternative A.	Same as Alternative B.
4015	BR:1.1 BR:1.3	Use prescribed fire, wildland fire use, and appropriate chemical, mechanical, and biological treatments could be used to meet vegetation management objectives.	Naturally occurring wildland fires and biological treatments would be used to treat vegetation to meet vegetation management objectives throughout the planning area.	Chemical, mechanical and biological treatments could be used to meet vegetation management objectives throughout the planning area.	Same as Alternative A.
4016	BR:1.1	A representative cushion plant community is protected with an NSO.	No surface-disturbing activities or surface disturbance of any nature or for any purpose other than for protection or enhancement of the species would be allowed in any cushion plant community.	No restrictions would be applied to any cushion plant community area.	Representative cushion plant communities would be NSO areas.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – VEGETATION RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		FORESTRY			
4017	BR:1.4	The acres of forest resources (forestlands and woodlands) treated annually are not specified; however, volume of timber removed from treated acres must not exceed the annual sustained yield capacity of these lands.	Approximately 50 acres of forestland ("forestland ecosystem management areas") and 50 acres of woodland ("woodland ecosystem management areas") approximately are treated annually (per decade, approximately 500 acres of forestland and 500 acres of woodland) by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and (or) composition to more historical conditions.	Approximately 150 acres of forestland ("forestland ecosystem management areas") and 100 acres of woodland ("woodland ecosystem management areas") approximately are treated annually (per decade, approximately 1,500 acres of forestland and 1,000 acres of woodland) by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and (or) composition to more historical conditions.	An average of 75 acres of forestland ("forestland ecosystem management areas") and 75 acres of woodland ("woodland ecosystem management areas") approximately are treated annually (per decade, approximately 750 acres of forestland and 750 acres of woodland) by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and (or) composition to more historical conditions.
4018	BR:1.4	Approximately 19,008 acres of forestland are managed to meet public demand. Existing forestlands are perpetuated and increased as they are treated. No annual allowable probable sale quantity is specified; however, sale quantities must not exceed the annual sustained yield capacity of the forestlands.	Approximately 19,008 acres of forestland would be actively managed and called "forest ecosystem management areas," with an annual allowable probable sale quantity of 444 CCF (200 MBF); or per decade, 4,440 CCF (2 MMBF).	Approximately 19,008 acres of forestland would be actively managed and called "forest ecosystem management areas," with an annual allowable probable sale quantity of 1,333 CCF (600 MBF); or per decade, 13,330 CCF (6 MMBF).	Approximately 19,008 acres of forestland would be actively managed and called "forest ecosystem management areas," with an annual allowable probable sale quantity of 667 CCF (300 MBF); or per decade, 6,670 CCF (3 MMBF).
4019	BR:1.4 BR:1.5	No similar action.	Approximately 3,000 acres of forestland and woodland within the Raymond Mountain WSA are managed by prescribed fire or wildland fire use to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives. No mechanical and (or) surface-disturbing activities are prescribed. No forest products are removed from this area. The forestlands and woodlands within the WSA are called "reserved forest ecosystem management areas."	Same as Alternative B.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – VEGETATION RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4020	BR:1.4	No similar action.	Approximately 15,000 acres of woodland (aspen and juniper) are actively managed to create more historical conditions and called "woodland ecosystem management areas." No specified annual sale quantity is identified. Forest products are provided as a byproduct consistent with forest health, landscape restoration, and reduction of forest fuels objectives.	Same as Alternative B.	Same as Alternative B.
4021	BR:1.4 BR:1.6	No similar action.	Old growth forest areas are retained and other forested areas may be restored to old growth conditions at appropriate locations and distribution levels, as evaluations occur, using an adaptive management approach. Old growth forest characteristics are identified for the various forest types and are listed in the glossary. Connectivity of existing or potential old growth areas are adopted whenever feasible.	Old growth forest areas are retained at appropriate locations and distribution levels, as evaluations occur, using an adaptive management approach. Old growth forest characteristics are identified for the various forest types and are listed in the glossary. Connectivity of existing or potential old growth areas are adopted whenever feasible.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – VEGETATION RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		WETLAND AND RIPARIAN COMMUNITIES			
4022	BR:2.1	Management actions in riparian areas will include measures to preserve, protect, and, if necessary, restore natural functions.	Manage all riparian areas for mid-to late-successional stage vegetation.	Same as Alternative A.	Riparian areas would be maintained, improved, or restored to enhance habitat forage conditions for wildlife and livestock and improve stream water quality. Manage all riparian areas with sensitive wildlife and plant species concerns to a successional stage appropriate for the benefit of those species, including vertical as well as horizontal vegetative structure and composition.
4023	BR:4.1	Locations of livestock salt or mineral supplements comply with requirements determined on a site-specific basis.	Locate livestock salt or mineral supplements a minimum of ½ mile away from water sources, riparian areas, and aspen stands.	Same as Alternative A.	Locate livestock salt or mineral supplements a minimum of ¼ mile away from water sources, riparian areas, and aspen stands. Buffers are based on resource concerns on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – FISH AND WILDLIFE RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4024	BR:3-5.1 BR:3-5.3 BR:3-5.4 BR:3-5.5 BR:3-5.6 BR:6.1 BR:6.3 BR:6.5 BR:6.6 BR:6.7 BR:7.1 BR:7.3 BR:7.4 BR:7.5 BR:7.6 BR:7.7 BR:8.1 BR:8.3 BR:8.4 BR:8.5 BR:8.4 BR:8.6	Currently, no seasonal limitations associated with fish species are applied for surface-disturbing activities.	Apply seasonal limitations for surface-disturbing activities within the floodplain or 1,000 feet (whichever is greater) of fish-bearing streams to protect game and nongame fish species during spawning, egg incubation, and fry stages. Dates will vary by species and location. Coordination on a case-by-case basis with WGFD will occur to determine crucial dates.	Same as Alternative A.	Protect critical life stages for game and nongame fish species by limiting disturbance activities in fish bearing streams on a case-by-case basis. Coordination with WGFD will occur for specific projects to determine crucial dates. Exceptions can be made if the NEPA analysis shows little or no impact.
4025	BR:3-5.1 BR:3-5.3 BR:3-5.4 BR:3-5.5 BR:3-5.6 BR:6.1 BR:6.3 BR:6.5 BR:6.6 BR:6.7 BR:7.1 BR:7.3 BR:7.5 BR:7.6 BR:7.7 BR:8.1 BR:8.3 BR:8.4 BR:8.5 BR:8.6	Human-caused barriers to fish passage are not actively addressed under current management.	Human-caused barriers to fish passage could be removed where appropriate and (or) feasible to provide for more genetic diversity and population stability. Human-caused barriers may be placed in some situations to protect conservation populations of fish species from hybridization or competition.	Same as Alternative A.	Same as Alternative B.
4026	BR:3-5.1 BR:3-5.2 BR:3-5.4 BR:3-5.6 BR:6.1 BR:6.2 BR:6.5 BR:6.7 BR:7.1 BR:7.2 BR:7.5 BR:7.7 BR:8.1 BR:8.2 BR:8.4 BR:8.6	BLM fencing standards are applied to newly constructed fences on BLM-administered lands within the planning area.	Remove or modify all BLM fences to comply with BLM Manual 1741 fencing standards to eliminate potential conflicts with wildlife and special status species.	Same as Alternative A.	Same as Alternative A, except eliminate or modify existing fences to reduce conflicts on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – FISH AND WILDLIFE RESOURCES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4027	BR:3-5.1 BR:3-5.2 BR:3-5.4 BR:3-5.6 BR:6.1 BR:6.2 BR:6.4 BR:6.5 BR:6.7 BR:7.1 BR:7.2 BR:7.4 BR:7.5 BR:7.7 BR:8.1 BR:8.2 BR:8.4 BR:8.6	No current provisions exist for managing migration corridors.	Identify and preserve traditional migration and travel corridors for big game wildlife species and migratory birds.	Identify and develop management for traditional migration and travel corridors for big game wildlife species and migratory birds.	Identify and work collaboratively to develop management of migration corridors for big game wildlife species and migratory birds to reduce conflicts.
4028	BR:3-5.1 BR:3-5.4 BR:3-5.5 BR:3-5.6 BR:6.1 BR:6.5 BR:6.6 BR:6.7 BR:7.1 BR:7.5 BR:7.6 BR:7.7 BR:8.1 BR:8.4 BR:8.5 BR:8.6	No current requirements exist to prevent perching on overhead powerlines.	Bury all new (low voltage) utility lines and install BLM-approved anti-perch devices on all new high voltage utility lines.	Burial of all new (low-voltage) utility lines is not required, nor is installation of BLM-approved anti-perch devices on new high voltage utility lines.	Bury new utility lines or install BLM-approved anti-perch devices on all new utility lines within sagebrush and (or) semiarid shrub-dominated habitats, unless NEPA analysis shows little or no impact without burial or modification.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – SPECIAL STATUS SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		SPECIAL STATUS SPECIES - PLANTS			
4029	FR:1.1 FR:1.2 FR:1.3	Use of fire suppression chemicals, including foaming agents and surfactants, is not allowed in special status plant species populations.	Use of fire suppression chemicals, including foaming agents and surfactants, is not allowed within ¼ mile of special status plant species populations.	Same as Alternative A.	Use of fire suppression chemicals, including foaming agents and surfactants, is not allowed within 200 feet of special status plant species populations.
4030	LR:6.1 LR:6.2 LR:7.1	No specific measures to protect special status plants species populations from motor vehicles currently exist.	Special status plant species populations are closed to fire suppression vehicle use.	Same as Alternative A.	All vehicles, including fire suppression vehicles, are restricted to existing roads and trails in special status plant species populations. The Kemmerer Field Office authorized officer has the discretion to lift this requirement in an emergency situation.
4031	BR:1.1 BR:1.2	All appropriate measures to protect all threatened, endangered, and sensitive plant species are applied to all actions and use authorizations. These measures could include avoidance, NSO, and "no surface disturbance." Four populations of *Physaria dornii* have an NSO designation.	Known locations of special status plant species are protected and closed to the following: (1) Surface-disturbing activities that could adversely impact the plants or their habitats. (2) Mining claim location (select locations would be formally withdrawn from mining claim location). (3) Mineral material sales. (4) All off-road vehicular use, including those vehicles used for geophysical exploration activities, surveying, etc. (5) Use of explosives and blasting. All populations of *Physaria dornii* have an NSO designation.	Same as Alternative A, except remove NSO designations for *Physaria dornii*.	Same as Alternative B, except no NSO on *Physaria dornii* populations.
4032	BR:1.1 BR:1.2	Areas where special status plants are known to exist are ROW avoidance areas. The authorized officer could grant exceptions if analysis shows that there is no adverse impact to the plant populations. (BLM WY Sensitive Species Policy and Manual 6840)	Areas where special status plants are known to exist are ROW exclusion areas.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – SPECIAL STATUS SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4033	BR:1.1 BR:1.2	Potential habitats of special status plant species on federal lands or on split-estate lands require searches for the plant species prior to approving any project or activity. Should special status plant species be found, all disruptive activities are halted until species-specific protective measures are developed and implemented. For federally listed species, protective measures are developed and implemented in coordination with the USFWS. (BLM WY Sensitive Species Policy and Manual 6840 and ESA)	Potential habitats of special status plant species on federal lands or on split-estate lands require searches for the plant species prior to approving any project or activity. Should species be found, all disruptive activities are halted.	No searches for special status plants are required, except for federally listed, proposed, and candidate species, before approving any project or activity.	Same as Alternative A.
4034	BR:1.1 BR:1.2	Potential habitat areas of special status plant species are areas of CSU for surface-disturbing activities. (BLM WY Sensitive Species Policy and Manual 6840)	Surface-disturbing activities are prohibited in potential habitat areas of special status plant species.	No limitations are placed on surface-disturbing activities in potential habitat areas of special status plant species.	Same as Alternative A.
4035	BR:1.1 BR:1.2	Potential habitat areas of special status plant species would be areas of CSU for surface-disturbing activities. (BLM WY Sensitive Species Policy and Manual 6840)	Vegetation treatments in special status plant species habitats would be conducted only when they would benefit these species.	Vegetation treatments in special status plant species habitats would be conducted to produce a desired plant community to benefit all resources in compliance with sensitive species policy.	Vegetation treatments in special status plant species habitats could be conducted on a case-by-case basis when they would benefit these species.
4036	LR:4.1	No salt or mineral supplements are allowed on special status plant species populations (BLM WY Sensitive Species Policy and Manual 6840).	No salt or mineral supplements are allowed within ½ mile of special status plant species populations.	Same as Alternative A.	No salt or mineral supplements are allowed within ¼ mile of special status plant species populations. Buffers are based on resource concerns on a case-by-case basis.
4037	LR:4.1	Range improvement projects such as troughs, reservoirs, fences, and other surface-disturbing activities are not allowed on special status plant species populations.	Range improvement projects such as troughs, reservoirs, fences, and other surface-disturbing activities are not allowed within ½ mile of special status plant species populations, unless they are determined to be beneficial to that species.	Same as Alternative A.	Range improvement projects, such as troughs, reservoirs, and fences, are not allowed on special status plant species populations. Buffers are based on resource concerns on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – SPECIAL STATUS SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		SPECIAL STATUS SPECIES - FISH			
4038	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No similar action.	Similar management actions as found in the Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan are applied to support habitat and fisheries objectives for the Snake River cutthroat trout.	Same as Alternative A.	Same as Alternative B.
		SPECIAL STATUS SPECIES - WILDLIFE			
4039	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:6.7 BR:7.2 BR:7.8	No similar action.	Avoid habitat fragmentation through attenuation, siting, and consolidation of roads, energy facilities, and other developments in identified special status species habitats to no more than 3 percent of available habitats.	Avoid habitat fragmentation through attenuation, siting, and consolidation of roads, energy facilities, and other developments in identified special status species habitats, unless appropriate mitigation is initiated.	Same as Alternative C.
4040	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	Greater sage-grouse are protected by surface-disturbance stipulations. For leks, there is a restriction buffer within ¼ mile of the perimeter of occupied greater sage-grouse leks. Avoid human activity between 8 p.m. and 8 a.m. from March 1 through May 15 within ¼ mile of the perimeter of occupied greater sage-grouse leks. Avoid surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek.	Prohibit surface-disturbing and disruptive activities within ¼ mile of the perimeter of active greater sage-grouse leks; avoid human activity between 8 p.m. and 8 a.m. from February 1 through May 15 within ¼ mile of the perimeter of occupied greater sage-grouse leks. Prohibit surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood rearing habitats within 2 miles of an occupied greater sage-grouse lek or in identified nesting or brood rearing habitats outside the 2-mile buffer from March 15 through July 15. Prohibit surface-disturbing and disruptive activities in suitable greater sage-grouse winter concentration areas from November 15 through April 30.	Avoid surface-disturbing and disruptive activities within ¼ mile of the perimeter of active greater sage-grouse leks; avoid human activity between 8 p.m. and 8 a.m. from March 1 through May 15 within ¼ mile of the perimeter of occupied greater sage-grouse leks. Avoid surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood rearing habitats within 2 miles of an occupied greater sage-grouse lek.	The following distances and timeframes will be utilized to manage activities that may impact greater sage-grouse or their habitats. These distances and timeframes are based on current information, but may be subject to change in the future based upon new information. • **Greater sage-grouse leks**: (1) Avoid surface disturbance or occupancy within ¼ mile of the perimeter of occupied greater sage-grouse leks; (2) Avoid human activity between 8 p.m. and 8 a.m. from March 1 through May 15 within ¼ mile of the perimeter of occupied greater sage-grouse leks. • **Greater sage-grouse nesting and early brood-rearing habitats**: Avoid surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek, or in identified greater sage-grouse nesting and early

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – SPECIAL STATUS SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
					brood-rearing habitats outside the 2-mile buffer from March 15 through July 15. • **Greater sage-grouse winter habitat**: Avoid surface disturbance and disruptive activities in occupied greater sage-grouse winter habitats from November 15 through March 14. Exceptions to CSU and timing restrictions will continue to be considered on a case-by-case basis.
4041	BR:3-5.2 BR:3-5.5 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No requirements to locate facilities or reduce noise levels of equipment to minimize the impacts of continuous noise on species relying on aural cues for successful breeding currently exist.	Locate facilities or reduce noise levels to 49 dB or less as measured 150 feet from the noise source to minimize the impacts of continuous noise on species relying on aural cues for successful breeding.	Same as Alternative A.	Locate facilities or reduce noise levels to 49 dB or less as measured 900 feet from the noise source to minimize the impacts of continuous noise on species relying on aural cues for successful breeding.
4042	BR:3-5.2 BR:3-5.5 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No restrictions on any high-profile structures within sagebrush obligate habitats currently exist.	Prohibit new high-profile structures (higher than 12 feet) within 1 mile of occupied sagebrush obligate habitats.[1] Prohibit new high-profile structures relying on guy wires for support in these habitats.	Same as Alternative A.	Avoid new high-profile structures (higher than 12 feet) within 1 mile of occupied sagebrush obligate habitats unless anti-perch devices are installed. Prohibit new high-profile structures relying on guy wires for support in these habitats. Exceptions can be made if NEPA analysis shows little or no impact to sagebrush obligate species.
4043	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No activity or surface disturbance is allowed for up to a ¾-mile radius from any active raptor nest sites from February 1 through July 31 (except peregrine falcon restrictions that extend from February 1 through August 15). Within the Moxa Arch area of oil and gas development, restrictions are applied within a 1-mile radius of ferruginous hawk nests. Actual distances and dates will vary based on topography, species, season of use, and other pertinent factors.	Surface-disturbing and disruptive activities to nesting raptors are prohibited within 1½ miles of an active raptor nest during the following time periods for the protection of raptor nesting areas: February 1 through July 15: golden eagle, barn owl, red-tailed hawk, great-horned owl, other raptors March 1 through July 31: short-eared owl, long-eared owl, ferruginous hawk, peregrine falcon, screech owl	Same as Alternative B, except disruptive activities to nesting raptors are prohibited within ½ mile.	Surface-disturbing and disruptive activities to nesting raptors are prohibited within the following distances from an active nest from February 1 through July 31 with the exception of burrowing owl (April 1 through September 15, or whenever the young have fledged) and northern goshawk (April 1 through August 31): 1-mile buffer: ferruginous hawk ¾-mile buffer: golden eagle, barn owl, red-tailed hawk, great-horned owl, osprey, merlin, sharp-shinned hawk, kestrel, prairie

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – SPECIAL STATUS SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			April 1 through July 31: osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, Cooper's hawk April 1 through September 15, or whenever the young have fledged: burrowing owl April 1 through August 31: northern goshawk		falcon, northern harrier, Swainson's hawk, Cooper's hawk, short-eared owl, long-eared owl, peregrine falcon, screech owl, burrowing owl, northern goshawk, and other raptors Time periods can be adjusted based on specific needs of identified species. The following time periods will be applied as appropriate: February 1 through July 15: golden eagle, barn owl, red-tailed hawk, great-horned owl, other raptors March 1 through July 31: short-eared owl, long-eared owl, ferruginous hawk, peregrine falcon, screech owl April 1 through July 31: osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, Cooper's hawk
4044	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No similar action.	Prohibit surface-disturbing activities in identified pygmy rabbit habitats.[1]	Avoid surface-disturbing activities in occupied pygmy rabbit habitats.	Same as Alternative C.
4045	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:7.2 BR:7.8	No similar action.	Prohibit surface-disturbing and disruptive activities in all white-tailed prairie dog colonies or complexes 100 acres or greater.[1]	Same as Alternative A.	Avoid activities that could result in collapse of burrows in occupied white-tailed prairie dog colonies or complexes 200 acres or greater, unless appropriate mitigation occurs.
4046	BR:3-5.2 BR:3-5.7 BR:3-5.8 BR:6.7 BR:7.2 BR:7.8	No similar action.	Identify and preserve traditional migration and travel corridors for special status species.	Identify and develop management for traditional migration and travel corridors for special status species.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives *(Continued)*

4000 BIOLOGICAL RESOURCES (BR) – INVASIVE NONNATIVE SPECIES					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
4047	BR:1.1 BR:1.2 BR:1.3	Aerial application of chemicals would not be allowed within 100 feet of wetlands, riparian areas, and aquatic habitats. Exceptions could be applied to manage riparian weed species. Applications of chemicals will follow label requirements.	Aerial application of chemicals would not be allowed within ½ mile of wetlands, riparian areas, and aquatic habitats.	Same as Alternative A.	Same as Alternative A.
4048	BR:1.1 BR:1.2 BR:1.3	Vehicle and hand application of chemicals would not be allowed within 25 feet (by vehicle) or 10 feet (by hand) of wetlands, riparian areas, and aquatic habitats. Application of chemicals will be done in accordance with label instructions. Exceptions could be applied to manage riparian weed species.	Vehicle and hand application of chemicals would not be allowed within ¼ mile of wetlands, riparian areas, and aquatic habitats.	Same as Alternative A.	Same as Alternative A.
4049	BR:1.1 BR:1.2 BR:1.3	Mix chemicals a minimum of 500 feet away from riparian areas, water sources, floodplains, and known special status plant species populations.	Mix chemicals a minimum of ¼ mile away from riparian areas, water sources, and floodplains.	Mix chemicals a minimum of 100 feet away from riparian areas, water sources, and floodplains.	Same as Alternative A.
4050	BR:1.1 BR:1.2 BR:1.3	Application of chemicals around special status plant species is determined on a case-by-case basis in coordination with the authorized officer.	Aerial application of chemicals is not allowed within ½ mile of special status plant species. Vehicle and hand application is not allowed within ¼ mile of special status plant species.	Same as Alternative A.	Same as Alternative A.
4051	BR:1.2 BR:1.3	No similar action.	Require the use of certified weed-free forage and feeds to prevent establishment of new weed areas.	Recommend the use of certified weed-free forage and feeds.	Same as Alternative B.
4052	BR:1.2 BR:1.3	No similar action.	Require the use of certified weed-free seed and mulch for rehabilitation projects.	Recommend the use of certified weed-free seed and mulch for rehabilitation projects.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		5000 HERITAGE RESOURCES (HR) – CULTURAL			
		Goal HR:1 Preserve and protect Native American sensitive sites and ensure they are available for appropriate uses by present and future generations. **Objectives:** **HR:1.1** Identify Native American sensitive sites on BLM-administered lands within the planning area. **HR:1.2** Establish a process that allows BLM to evaluate probability for occurrence of Native American sensitive sites and their potential significance. **HR:1.3** Ensure consultation and coordination with Native American tribes regarding potential treaty rights issues. **Goal HR:2** Preserve and protect NHTs, as well as other significant cultural resources and ensure that they are available for appropriate uses by present and future generations. **Objectives:** **HR:2.1** Ensure recreational use will be compatible with historic trail values. **HR:2.2** Establish appropriate management prescriptions in zones of high, medium, and low management level for NHT segments. **HR:2.3** Coordinate with recreation and other programs to provide opportunities for public visitation, interpretation, education, and appreciation of NHTs. **Goal HR:3** Reduce imminent threats from natural or human-caused deterioration or potential conflicts with other resource uses. **Objectives:** **HR:3.1** Pursuant to Section 110 of the NHPA, identify other cultural resources in the planning area by defining priority geographic areas for new field inventory based on a probability for unrecorded significant cultural resources. **Goal HR:4** Promote stewardship, conservation, and appreciation of cultural resources. **HR:4.1** Manage NHTs and other historic trail resources for long-term heritage, recreational, and educational values. **HR:4.2** Enhance public experience through interpretive facilities and support of heritage tourism.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
5001	HR:1.1 HR:1.2 HR:1.3	Continue working relationship with tribes including consulting with tribes to develop specific measures to ensure that areas important to Native American communities are not transferred from federal ownership or physically modified or affected by decisions in ways that restrict or deny access to Native Americans for traditional uses protected by treaty rights.			
5002	HR:1.1 HR:1.2 HR:1.3	Categorize all cultural properties according to six use allocations: scientific use, conservation use, public use, traditional use, experimental use, and discharged from public use.			
5003	HR:2.2 HR:4.1	Pursuant to Section 106 of NHPA and the State Protocol, case-by-case reviews for specific undertakings require analysis and assessments of effects of NHT settings beyond the distances specified above.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

5000 HERITAGE RESOURCES (HR) – CULTURAL					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
5004	HR:1.1 HR:1.2 HR:1.3	No current management (BLM 1986a). Evaluate on a project-by-project basis.	Conduct ethnographic research and consult with tribes to proactively identify all sensitive sites within the planning area.	Conduct tribal consultation only on projects where known site types are encountered.	Prescribe timing and degree of Native American consultation by zones of high, medium, and low probability for sensitive sites identified in consultation with tribes and based on available data. Until such time as zones are identified, tribal consultation is conducted on projects where known site types are encountered and on types of projects for which tribal concerns are identified.
5005	HR:1.2 HR:1.3	Consult with tribes and applicants on specific projects to determine protection measures on threatened sites. Implement protection measures.	Consult with tribes to develop specific measures to preserve and protect all sensitive sites.	Same as Alternative A.	In consultation with Native American tribes, develop standards for programmatic management based on the type of site. Until such programmatic management standards are developed, consult with tribes and applicants on specific projects to determine protection measures on threatened sites and implement protection measures.
5006	HR:3.1	Conduct inventories prior to all surface-disturbing activities (environmental assessments).	Use Class I overview to proactively identify zones of high, medium, and low probability for cultural sites. Conduct Class III inventories in priority areas.	Conduct Class II or Class III inventories in areas where expected development or management decisions are likely to impact cultural sites. Exclude the requirement for further cultural resource inventories in low site density areas for future projects.	Use Class I overviews to proactively identify zones of high, medium, and low probability for cultural sites, and identify where current and future land uses threaten cultural sites. Conduct Class III inventories in zones where greatest threats to cultural resources exist.
5007	HR:4.2 HR:3.1	NSO for minerals in 480 acres at the Bridger Antelope Trap.	Prohibit all surface-disturbing activities, close the area to OHV use, and exclude prescribed burns and vegetation treatments in the federal section (640 acres) that contains the Bridger Antelope Trap.[1] Withdraw the federal section that contains the Bridger Antelope Trap from operation of the mining laws.	Same as Alternative A.	Restrict surface-disturbing activities in the federal section (640 acres) that contains the Bridger Antelope Trap. Restrictions include NSO for minerals in the section, and OHV use is limited to the currently existing established road. Prescribed vegetation treatments could occur to protect the physical characteristics of the site. Withdraw the federal section that contains the Bridger Antelope Trap from operation of the mining laws.

Table 2-3. Detailed Table of Alternatives *(Continued)*

5000 HERITAGE RESOURCES (HR) – CULTURAL					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
5008	HR:4.1	All significant historical, archeological, and cultural sites are protected or mitigated. Some additional management prescriptions exist specific to the following sites: Emigrant Spring/Slate Creek Emigrant Spring/Dempsey Johnston Scout Rock Alfred Corum emigrant gravesite. No current management prescriptions exist (BLM 1986a) specific to the following sites: Nancy Hill emigrant gravesite Pine Grove emigrant camp Rock Gap trail landmark Bear River Divide trail landmark.	Prohibit establishment of ROW corridors and wind-energy projects, as well as all surface-disturbing activities.[1] The area is closed to OHV use and prescribed burns, and vegetation treatments on the BLM-administered lands within the defined boundaries of the following sites are excluded: Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres).	Same as Alternative A.	Manage surface-disturbing activities on BLM-administered lands within the defined boundaries of the sites listed below by restricting the following activities: NSO for minerals on newly issued leases, OHV use limited to existing established roads, and the areas are right-of-way exclusion zones.[1] Management prescriptions using vegetation treatments to protect or enhance the sites are allowed. Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres)
5009	HR:4.1	Develop cultural resources management plans for significant sites. The need for such activity plans will be determined on a case-by-case basis.	Develop cultural resource management plans for the following sites: Bridger Antelope Trap Emigrant Spring/Slate Creek Emigrant Spring/Dempsey Johnston Scout Rock Alfred Corum and Nancy Hill emigrant gravesites Pine Grove emigrant camp Rock Gap trail landmark.	Same as Alternative A.	Cultural resource management plans could be developed for significant sites including, but not limited to, the following: Bridger Antelope Trap Emigrant Spring/Slate Creek Emigrant Spring/Dempsey Johnston Scout Rock Alfred Corum and Nancy Hill emigrant gravesites Pine Grove emigrant camp Rocky Gap trail landmark.

Table 2-3. Detailed Table of Alternatives *(Continued)*

5000 HERITAGE RESOURCES (HR) – CULTURAL					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
5010	HR:2.1 HR:2.2 HR:2.3 HR:4.1	The objective will be to protect the trails (NHTs) from visual intrusion and surface disturbance and to maintain the integrity of setting. To provide a protective corridor for the trail, generally visual intrusion and surface disturbance will be restricted or prohibited within 1,320 feet from either side of an historic trail (may depend on topography and existing surface disturbance), or within the visual horizon of the trail, whichever is closer.	Protect the physical evidence of NHTs (ruts and [or] traces, graves, campsites, landmarks) by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances:[1] (1) Segments with high management level: 1 mile on each side of trail segments and within a 1-mile radius of gravesites and landmarks. (2) Segments with medium management level: ½-mile on each side of trail segments and within a ½-mile radius of gravesites and landmarks. (3) Segments with low management level: ¼ mile on each side of trail segments.	Protect the physical evidence of NHTs (ruts and [or] traces, graves, campsites, landmarks) by prohibiting or restricting surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the distances specified below. The definition and management of the corridor may depend on topography and existing surface disturbance. (1) Segments with high management level: ¼-mile on each side of trail segments and within a ¼-mile radius of gravesites and landmarks. (2) Segments with medium management level: 500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Segments with low management level: 100 feet on each side of trail segments. Crossings at right angles to trails could be permitted on a case-by-case basis.	Protect the physical evidence of NHTs designated under the National Trails System Act (ruts and traces, graves, campsites, landmarks) that exist on lands within federal jurisdiction by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances:[1] (1) Segments with high management level: ¼-mile on each side of trail segments and within a ¼-mile radius of gravesites and landmarks. (2) Segments with medium management level: 500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Segments with low management level: 100 feet on each side of trail segments and within a 100-foot radius of gravesites and landmarks. Crossings at right angles to trails could be permitted on a case-by-case basis. This could require boring beneath the trail trace.
5011	HR:2.3 HR:3 HR:4.2	Locations of livestock salt or mineral supplements would comply with requirements determined on a site-specific basis.	Locate livestock salt or mineral supplements a minimum of ½ mile away from NHTs.	Same as Alternative A.	Generally locate livestock salt or mineral supplements a minimum of ¼ mile away from NHTs. Buffers would be coordinated with grazing permittees in consideration of all resource concerns in the area.
5012	HR:2.1 HR:2.2 HR:2.3 HR:4.1	Management of NHTs emphasizes preservation coupled with increased visitor use and appreciation of the trail system. Currently, eight sites have interpretive signs as NHTs.	Develop and enhance significant segments and sites by installing directional signs to trail segments from main roads, trail markers at trail traces, and interpretative signs. Acquire legal access for public visitation to trail segments. Develop a stewardship program to lead trail tours, monitor sites, and generally assist with management.	Same as Alternative A, except maintain the existing interpretative sites.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

		5000 HERITAGE RESOURCES (HR) – PALEONTOLOGY			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal HR:5 Promote the scientific knowledge of paleontological resources on BLM-administered lands within the planning area. **Objective:** **HR:5.1** Provide for paleontological research of all fossils, limited recreational collection of common invertebrate and plant fossils, and protection of significant fossils on BLM-administered lands within the planning area.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
5013	HR:5.1	Continue to allow research and collection for research purposes of fossils on BLM-administered lands.			
5014	HR:5.1	Continue to allow dispersed recreational collection of common invertebrate and plant fossils on public lands.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
5015	HR:5.1	Data submitted to the BLM are collected and kept for reference.	Utilize inventory data to identify areas outside of Fossil Basin for special protection and management to preserve and study vertebrate fossil resources.	Same as Alternative A.	Data submitted to the BLM is collected and kept for reference. Use current and future inventory data to identify and, if necessary, designate specific site(s) for protection.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		6000 LAND RESOURCES (LR) – LANDS AND REALTY			
		Goal LR:1 Manage the acquisition, disposal, and allocation of public lands. **Objective:** **LR:1.1** Respond to internal and external requests for land transfers (e.g., R&PP Act actions, land sales, exchanges, and withdrawals). **Goal LR:2** Support national energy plans and policies regarding development of renewable and nonrenewable energy sources. **Objective:** **LR:2.1** Respond to internal and external requests for land authorizations. **Goal LR:3** Manage public lands to meet access and (or) ROW needs. **Objective:** **LR:3.1** Acquire legal easements to public lands for recreational opportunities and management of public land resources.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
6001	LR:1.1	Conduct review of withdrawals, and determine whether the withdrawal is still necessary. Only lands that will enhance multiple-use management and protection of nationally significant resource values and do not create a liability or burdensome management cost to the BLM will be accepted back into the public domain. New withdrawals will be considered as the need arises. New requests will be processed for protection of resources prior to lifting existing withdrawals, when those withdrawals are in the same location. Areas that contain withdrawal conflicts will be handled on a case-by-case basis.			
6002	LR:1.1 LR:2.1	Manage lands and (or) interests (access) in lands acquired in a manner consistent with adjacent or nearby public lands.			
6003	LR:2.1	Consider temporary use permits for areas to be used only during construction or for other short-term needs.			
6004	LR:2.1	Consider R&PP leases and patents as requested by qualified entities.			
6005	LR:1.1	Proceed with withdrawal for Cokeville Meadows petition as filed by USFWS.			
6006	LR:1.1	At the implementation stage, site-specific analysis with public participation would be conducted. Based on the analysis and public comments received, a determination will be made on whether disposal of the parcel is in the public's best interest. If it is not in the public's best interest, the parcel will be retained in public ownership.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LANDS AND REALTY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6007	LR:1.1	Lands identified for potential disposal (59,508 acres): BLM 1986a Appendix G in addition to actions completed to date. Lands identified for disposal under Sections 203 and 206 of the FLPMA and identified as such in this plan are hereby classified for disposal under Section 7 of the Taylor Grazing Act of 1934, as amended (43 USC 315f).	BLM-administered lands throughout the planning area are not considered for disposal.	Same as Alternative A and additional parcels will be considered for disposal on a case-by-case basis.	Same as Alternative A, except 35,823 acres are identified for potential disposal (Appendix G) and additional parcels will be considered on a case-by-case basis.
6008	LR:1.1	Consider DLEs on a case-by-case basis, based on soil characteristics, irrigation requirements, salinity issues, and the practibility of farming the lands as an economically feasible operating unit.	No BLM-administered public lands within the planning area are available for agricultural entry under DLE (43 CFR 2520) due to one or more of the following factors: unsuitable soils, lack of water supplies or legal water rights, rugged topography, or presence of sensitive resources.	Same as Alternative A.	Same as Alternative A.
6009	LR:2.1 LR:3.1	ROW corridors were not designated in the 1986 RMP (BLM 1986a). Land use authorizations are granted on a case-by-case basis.	Utility corridors are not designated through sites listed on the NRHP. Utility corridors are not designated where they are in conflict with NHTs management objectives. Preferred utility corridors are ¼-mile wide and designated as follows: New intrastate pipeline authorizations are established linking the Jonah Gas/Pinedale Anticline fields to existing plant sites in the planning area. New interstate pipeline authorizations are to follow the existing California and Pacific Coast States pipelines (Kern River/Colorado Interstate Gas corridor and the Ignacius/Sumas pipelines west to Muddy Creek Compressor area). Gathering pipelines for individual wells, usually 6 inches or less in diameter are to follow access roads associated with well pads. High-voltage powerline corridors are	Designate utility corridors, based on historic placement (i.e., powerline, pipelines, and fiber optic lines) on a case-by-case basis.	Same as Alternative B, except designate utility corridors, based on use (i.e., powerlines, pipelines, and fiber optic lines). Preferred utility corridors can be up to 2-miles wide (width is determined based on resource values) and are designated as follows, but variances are allowed based on application where conflicts with other resources are minimal or can be mitigated through resource specific stipulations. High-voltage powerline corridors are established north of and parallel to I-80, and along Wyoming SH 89 from the junction of I-80 and the Wyoming state line. Fiber optic and low-voltage powerline corridors are to be located along currently established road systems (e.g., interstate or state highways and paved county roads).

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LANDS AND REALTY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			established north of and parallel to I-80, and along Wyoming SH 89 from the junction of I-80 and the Wyoming state line. Fiber optic and low-voltage powerline corridors are to be located along currently established road systems (e.g., interstate or state highways and paved county roads).		
6010	LR:2.4 LR:3.1	Current management does not preclude placement of ROW within the boundaries of the following archeological sites: Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres).	The federal lands within the boundary of the following archeological sites are exclusion areas to ROW placement. Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres).	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LANDS AND REALTY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6011	LR:1.1	No specific decision regarding communication site areas currently exists.	Locate consolidated communication sites in the following areas only: Quealy Peak Medicine Butte Hickey Mountain BLM Wareyard	Consider communication sites on a case-by-case basis.	Consider communication sites by type in the following designated areas: Aspen Mountain, Big Hill, Boulder Ridge, Butcher Knife, Carter Creek, Church Buttes, Cokeville Ridge, Dempsey Ridge, Fontenelle, Fossil Ridge, Granger, Hickey Mountain, Kemmerer Site, Leroy, Medicine Butte, Pine Knoll, Quealy Peak, Road Hollow, Robertson, Sage Junction, Thomas Fork, Twin Butte/Nugget, Waterfall Other communication site areas could be developed on a case-by-case basis. Prior to approving new authorizations, the proponents must demonstrate to the BLM that they adequately considered sharing and multiple uses of existing facilities.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LANDS AND REALTY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6012	LR:2.1	No specific decision regarding renewable energy project areas currently exists.	Renewable energy projects (other than wind energy) will be considered throughout the planning area on a case-by-case basis.	Same as Alternative B.	Same as Alternative B.
6013	LR:2.1	No specific decision regarding wind-energy areas currently exists.	Wind-energy development projects (e.g., wind turbines and associated ancillary appurtenances) are allowed throughout the planning area with the following exceptions: crucial winter range; locations of active raptor nests and migration corridors; areas of greater sage-grouse leks and potential nesting habitats; areas within 5 miles of significant cultural areas (Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Nancy Hill/Alfred Corum emigrant gravesites, Pine Grove emigrant camp, Rock Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs) and high management level trail segments; the Raymond Mountain WSA; Class A or B scenery areas; and areas of sensitive and highly erosive soils. See Map 37 (176,109 acres of BLM-administered surface suitable for wind-energy development).	Wind-energy development is allowed throughout the planning area with the following exceptions: the Raymond Mountain WSA and within the boundaries of the Bridger Antelope Trap. See Map 38 (1,376,607 acres of BLM-administered surface suitable for wind-energy development).	Wind-energy development is allowed in the following portions of the planning area: The public lands west of U.S. Highway 30 to the Wyoming/Idaho state line (also known as Boundary Ridge); the public land south and east of U.S. Highway 189 (excluding Oyster Ridge) to the checkerboard land pattern; the checkerboard lands (excluding the federal section that contains the Bridger Antelope Trap, the federal sections within 3 miles of the Bridger Antelope Trap, and the federal sections in which the high management level NHT segments exist); the blocked BLM-administered lands north of I-80 and west of SH 412; the BLM-administered lands south of I-80 and east of State highway 412/414 outside of the checkerboard; the blocked BLM-administered lands outside of a corridor extending approximately 3 miles southwest of SH 414 to a corridor extending 3 miles southeast of SH 410/County Road 283. See Map 39 (780,714 acres of BLM-administered surface suitable for wind-energy development).
6014	LR:3.1	Legal access will be sought for areas intensively managed for timber production. Temporary easements may be used for specific actions for short time periods. High-priority area for access acquisition will be the Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and the Bear River Divide area to successfully manage public lands.	Same as Alternative A.	Legal access will be sought across private land if a need is identified in support of resource programs. Place emphasis on the following areas: Redeye Basin, Commissary Ridge, Raymond Mountain WSA, Dempsey Basin, Slate Creek crucial winter habitat area, Emigrant Springs Slate Creek, Rock Creek area, Little Muddy Creek, Meeks Cabin, Westfork, Graham Reservoir, Church Buttes, Wildcat Butte, Porter Hollow, Lincoln Highway, and Bridger Antelope Trap.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		6000 LAND RESOURCES (LR) – LIVESTOCK GRAZING MANAGEMENT			
		Goal LR:4 Maintain and (or) enhance livestock grazing opportunities and rangeland health. **Objectives:** **LR:4.1** Manage grazing to fulfill or make significant progress toward conformance with the Wyoming Standards for Healthy Rangelands. **LR:4.2** Monitor and evaluate rangeland health to determine appropriate management actions. **LR:4.3** AUM levels will be sustained on an allotment-by-allotment basis for livestock grazing, providing Wyoming Standards for Healthy Rangelands are met. **LR:4.4** Identify opportunities for range projects (e.g., water, etc.) and vegetation improvements to implement plans. **LR:4.5** Coordinate with appropriate entities to identify the need and source of additional water to assist in the distribution of grazing animals. **LR:4.6** Manage grazing to help meet vegetation resource objectives.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
6015	LR:4.1 LR:4.2 LR:4.4 LR:4.5	Develop and implement appropriate livestock grazing management actions to address rangeland health standards, improve forage for livestock, and enhance rangeland health.			
6016	LR:4.1 LR:4.2 LR:4.3	Authorize current amounts, kinds, and seasons of livestock grazing uses until rangeland health standards assessment results and (or) monitoring indicates a grazing use adjustment is necessary, or that a kind and (or) class of livestock or season of use modification can be accommodated.			
6017	LR:4.1 LR:4.4	Maintain current allotment categories (M, C, I designations, see Glossary).			
6018	LR:4.1 LR:4.4	Livestock conversions are allowed in allotments with riparian concerns only when a plan is approved to address riparian issues. Management actions and range improvements proposed to address riparian issues would have to be implemented prior to authorizing the conversion. Livestock conversions may be approved only after completion of a suitability study for the conversion. The conversion may be authorized if it is determined that riparian habitats will be maintained or improved by the conversion.			
6019	LR:4.1	Retain current livestock trails. Livestock trail width is ½ mile from the mapped centerline.			

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LIVESTOCK GRAZING MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6020	LR:4.3	The planning area is open to livestock grazing. There are a few small parcels, which are not permitted or leased for livestock grazing at the present time. Temporary nonrenewable permits have not been issued for unallocated parcels.	The planning area is open to livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary nonrenewable permits are issued for unallotted parcels. Manage unallotted public lands, excluding stock trails containing riparian areas with emphasis on wildlife and watershed objectives and exclude livestock uses.	Same as Alternative A, except issue temporary, nonrenewable permits for unallotted parcels for livestock grazing. Authorize livestock grazing on those small isolated tracts currently not permitted or leased for grazing, as well as all other public lands in the planning area.	The planning area is open to livestock grazing. A few small parcels are not permitted or leased for livestock grazing at the present time. The BLM can consider issuing 10-year renewable permits, temporary, nonrenewable permits, or not issuing grazing permits for these parcels.
6021	LR:4.3	Suspended AUMs currently are not available for livestock use. *Current preference and surveyed capacity are shown in Appendix B-4 of the 1986 RMP (BLM 1986a).*	Suspended AUMs are not to be activated for livestock use.	Suspended AUMs can be activated for livestock use on an allotment-by-allotment basis if the results of an evaluation based on the Wyoming Standards for Healthy Rangelands and monitoring data determined the forage is available.	Suspended AUMs can be activated for livestock use on an allotment-by-allotment basis if the results of an evaluation based on the Wyoming Standards for Healthy Rangelands and monitoring data or other information determined the forage was available.
6022	LR:4.1	Livestock operators in the Lost Creek/Ryan Creek allotments are held to the current permitted use. The 827 AUMs associated with the newly acquired federal lands in the Lost Creek/Ryan Creek area will be allocated for wildlife use.	Same as Alternative A.	The 827 AUMs associated with the newly acquired federal lands in the Lost Creek/Ryan Creek area are available for both livestock and wildlife use.	Same as Alternative A.
6023	LR:4.1 LR:4.4	No similar action.	Designate Christy Canyon allotment as a forage reserve. Up to 1,248 active federal AUMs may be available and are to be managed within priority criteria listed. Designate and manage future voluntary forage reserve allotments within the planning area on a case-by-case basis. Manage the forage reserve within priority criteria listed in Appendix B.	Forage reserve allotments are not designated.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – LIVESTOCK GRAZING MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6024	LR:4.1 LR:4.2	All areas except developed campgrounds are currently available for livestock grazing.	In addition to those small isolated tracts that are not leased or permitted for livestock grazing at the present time, the following areas are not available for livestock grazing: designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coal mines, sensitive cultural sites, and oil and gas production facilities.	The planning area is opened to livestock grazing on a case-by-case basis.	Same as Alternative A.
6025	LR:4.4	Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed only as a management tool for enhancement of wildlife values on a temporary nonrenewable basis.	The Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing.	Open Mike Mathias Wetlands at Wheat Creek Meadows to grazing.	Same as Alternative A.
6026	LR:4.1 LR:4.2 LR:4.3 LR:4.4 LR:4.5	Improve range conditions on I allotments and maintain M and C allotments. Grazing system and range improvements are designed to achieve management objectives for livestock grazing and serve as a primary means for improving or maintaining desired rangeland conditions.	Implement grazing system and range improvements to enhance watershed, riparian, and wildlife values, while reducing livestock conflicts with other resources.	Design grazing system and range improvements to maximize livestock grazing, while maintaining other resource values (e.g., meeting standards and guides).	Improve range conditions on I allotments and maintain M and C allotments. Design grazing systems and range improvements to achieve management objectives.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal LR:5 Provide a variety of appropriate recreation opportunities, experiences, and public benefits. **Objectives:** **LR:5.1** Identify recreation management areas for the planning area based on available resources. **LR:5.2** Provide public education regarding appropriate use of BLM-administered lands. **LR:5.3** Coordinate with other programs to provide opportunities for public visitation, interpretation, education, and appreciation of natural and cultural resources.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
6027	LR:5.1 LR:5.3	Allow dispersed recreation and permit special recreational activities (e.g., outfitting and guiding permits and OHV events permitted on an annual basis after evaluation).			
6028	LR:5.1	The planning area not covered by an SRMA is an ERMA. Manage the area in a custodial manner. Recreation management is compatible with other management in these areas.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6029	LR:5.3	Maintain existing facilities in improved campground areas. Maintain other existing permanent recreational facilities where appropriate.	Same as Alternative A, except no new permanent facilities are developed.	Maintain and enhance existing facilities in improved campground areas. Maintain and enhance other existing permanent recreational facilities. Develop additional recreational facilities where appropriate.	Same as Alternative C.
6030	LR:5.1	Areas within 400 feet of developed campgrounds are NSO.	Areas within ¼ mile of developed campgrounds are NSO.	Same as Alternative A.	Same as Alternative B.
6031	LR:5.1 LR:5.2 LR:5.3 HR:2.1 HR:2.3 HR:3.1	No SRMA.	The Pine Creek Canyon would be an SRMA. Objective: Enhance recreational opportunities while protecting the riparian, water, and wildlife values that exist in the area. Recreation market: residents from southwest Wyoming and Utah Recreation Niche: camping and dispersed recreation Primary Recreation Activities: hunting, camping, snowmobiling, driving for pleasure	The Pine Creek Canyon would be an SRMA. Objective: Enhance recreational opportunities. Recreation market: residents from southwest Wyoming and Utah Recreation Niche: camping and dispersed recreation Primary Recreation Activities: hunting, camping, snowmobiling, driving for pleasure	The Pine Creek Canyon would be an SRMA. Objective: Enhance recreational opportunities while protecting the riparian, water, and wildlife values that exist in the area. Recreation market: residents from southwest Wyoming and Utah Recreation Niche: camping and dispersed recreation Primary Recreation Activities: hunting, camping, snowmobiling, driving for pleasure

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			Management prescriptions: (1) Maintain facilities as they currently exist. (2) Restrict camping to areas outside of the riparian zone. (3) On developed recreation sites, unless specifically authorized, no person shall discharge firearms, other weapons, projectiles, or fireworks. (4) The Pine Creek Canyon SRMA would be managed as VRM Class II. (5) OHV use would be limited to the designated road. (6) Snowmobile use is limited to the groomed trail. Monitoring: Routine monitoring by field office personnel.	Management prescriptions: (1) Provide developed camping and other facilities as needed. (2) OHV use would be limited to existing roads and trails. (3) Snowmobile use would be limited to the groomed trail. Monitoring: Routine monitoring by field office personnel.	Management prescriptions: (1) Provide developed camping and other facilities as needed. (2) Monitor the Pine Creek Canyon riparian conditions and relocate camping use away from areas where resource damage is occurring. (3) On developed recreation sites, unless specifically authorized, no person shall discharge firearms, other weapons, projectiles, or fireworks. (4) The Pine Creek Canyon SRMA would be managed as VRM Class II. (5) OHV use would be limited to the designated road. (6) Snowmobile use is limited to the groomed trail. Monitoring: Routine monitoring by field office personnel.
6032	LR:5.1 LR:5.2 LR:5.3	No SRMA.	Raymond Mountain would be an SRMA. Objective: Manage the area to provide back country (non-motorized) dispersed recreation experiences. Recreation market: Local residents (southwest Wyoming, adjacent parts of Idaho and Utah) Recreation Niche: hunting, horseback use, hiking, camping Primary Recreation Activities: Hunting, hiking, horseback use, primitive camping Management prescriptions: (1) Prohibit mechanized vehicles within the SRMA. (2) Close the North and South Corral Creek trails to motorized vehicle use. (3) Close the SRMA to snow machine use. (4) Limit SRPs for guiding and outfitting to	Raymond Mountain would be an SRMA. Objective: Manage the area to provide back country (non-motorized) dispersed recreation experiences. Recreation market: local residents (southwest Wyoming, adjacent parts of Idaho and Utah) Recreation Niche: hunting, horseback use, hiking, camping Primary Recreation Activities: Hunting, hiking, horseback use, primitive camping Management prescriptions: (1) Snow machine use would be allowed in the Raymond Canyon Basin. (2) The North and South Corral Creek trails would remain open to motorized vehicle use. (3) Consider hiking trail and trailhead	Raymond Mountain would be an SRMA. Objective: Manage the area to provide back country (non-motorized) dispersed recreation experiences. Recreation market: local residents (southwest Wyoming, adjacent parts of Idaho and Utah) Recreation Niche: – hunting, horseback use, hiking, camping Primary Recreation Activities: hunting, hiking, horseback use, primitive camping Management prescriptions: (1) Allow mechanized vehicle use (mountain biking) on the existing trail in Raymond Canyon. (2) Close the North and South Corral Creek trails to motorized vehicle use. (3) Close the SRMA to snow machine use. (4) Guiding and outfitting SRPs would be

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			three operators at any one time. Monitoring: Routine monitoring by field office personnel. Area monitored to ensure compliance with WSA IMP.	development. Monitoring: Routine monitoring by field office personnel. Area monitored to ensure compliance with WSA IMP.	limited by number of operators during overlapping time periods. (5) Consider hiking trail and trailhead development. Monitoring: Routine monitoring by field office personnel. Area monitored to ensure compliance with WSA IMP.
6033	LR:5.1 LR:5.2 LR:5.3	No SRMA.	High management level portions of the Oregon-California National Historic Trail would be an SRMA. Objective: Manage trails to provide an opportunity to visit and learn about trail history and use, while maintaining setting character and present condition of trails and associated historic sites. Recreation market: Local residents and national and international and visitors Recreation Niche: heritage tourism and historic interpretation Primary Recreation Activities: visiting historic trails and sites, group trekking use Management prescriptions: (1) Cultural resource and NHT prescriptions apply (Please see Cultural Resources records 5001 to 5011 and VRM records 6050 to 6053). (2) Manage for Middle Country setting. (3) No motor vehicle use would be allowed on NHT trail trace. (4) SRPs for organized group use would limit group size, number of groups, and season of use for historic trails. Monitoring: Historic trails are a field office priority for monitoring.	Same as Alternative B.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6034	LR:5.1 LR:5.2 LR:5.3 HR:2.1 HR:2.3 HR:3.1	No SRMA.	BLM-administered lands (28,850 acres) in the Dempsey Ridge area would be managed as an SRMA. Objective: Manage the area to provide quality dispersed recreation opportunities including responsible motorized use of the proposed Emigrant Springs Back Country Byway in a natural setting. Recreation market: residents and national and international visitors Recreation Niche: hunting, driving for pleasure, heritage tourism, camping, wildlife viewing, historic interpretation Primary Recreation Activities: hunting, driving for pleasure, heritage tourism, visiting historic trails and sites Management prescriptions: (1) Manage for Middle Country setting. (2) No mineral material sales and (or) free use permits are authorized. (3) Area would be administratively unavailable for solid leasable mineral exploration, leasing, and development. (4) Pursue mineral withdrawals for locatable minerals. (5) Restrict all new ROW actions to existing utility corridors. (6) No new road developments are authorized. (7) No new high-profile structures, including wind-power facilities, are authorized. (8) Restrict OHV use to designated roads. No off-trail travel is allowed without prior approval from the authorized officer. (9) For NHTs and site settings, manage all surface-disturbing activities to retain the existing character of the landscape in	BLM-administered lands (28,850 acres) in the Dempsey Ridge area would be managed as an SRMA. Objective: Manage the area to provide quality dispersed recreation opportunities in a natural setting. Recreation market: residents of Wyoming, Idaho and Utah) Recreation Niche: hunting, driving for pleasure, heritage tourism, camping, wildlife viewing Primary Recreation Activities: hunting, driving for pleasure, heritage tourism Management prescriptions: No additional prescriptions would be applied. Monitoring: Routine monitoring by field office personnel. Monitoring of historic sites is a field office priority.	BLM-administered lands (28,850 acres) in the Dempsey Ridge area would be managed as an SRMA. Objective: Manage the area to provide quality dispersed recreation opportunities including responsible motorized use of the proposed Emigrant Springs Back Country Byway in a natural setting. Recreation market: residents of Wyoming, Idaho and Utah) Recreation Niche: hunting, driving for pleasure, heritage tourism, camping, wildlife viewing Primary Recreation Activities: hunting, driving for pleasure, heritage tourism Management prescriptions: (1) Manage for Middle Country setting. (2) Allow mineral development and other construction activities within the boundaries of the management area with the goal of no further loss of habitat function from these activities. Successful reestablishment or improvement of habitat could offset any new disturbance areas. (3) Pursue opportunities to reclaim existing roads that are not necessary to attain management objectives. (4) Preserve aspen groves and individual trees. In the Emigrant Spring/Dempsey area. (5) No salt licks or mineral supplements are allowed within ¼ mile of NHTs and the Alfred Corum and Nancy Hill emigrant gravesites. Monitoring: Routine monitoring by field office personnel. Monitoring of historic sites is a field office priority.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. (10) Alfred Corum and Nancy Hill emigrant gravesites are NSO for oil and gas leases and no new surface disturbance is allowed within the defined boundary of the sites. (11) Emigrant Spring/Dempsey NSO for oil and gas leases and no surface disturbance is allowed within the defined boundary of the site. Preserve aspen groves and individual trees. (12) No salt licks or mineral supplements are allowed within ½ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and the Alfred Corum and Nancy Hill emigrant gravesites. (13) Develop plant community objectives and implement appropriate management to meet and maintain wildlife habitat needs. (14) Proactively study and inventory the vertebrate fossil resources through paleontologic inventory by qualified paleontologists within the portion of Fossil Basin inside the management area. Significant sites are subject to further study, possibly including excavation, collection, and curation of fossils. (15) Protect important paleontologic sites by not allowing surface disturbance at the sites, except for disturbance in support of scientific research. In support of this, management prescriptions could include increased use of BLM law enforcement. (16) Complete a paleontology management plan for the management area to further scientific study and public education		

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – RECREATION					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			opportunities in the area. Monitoring: Routine monitoring by field office personnel. Monitoring of historic sites is a field office priority.		
6035	LR:5.1 LR:5.3	Camping is allowed throughout the planning area.	Close riparian areas throughout the planning area to camping.	Same as Alternative A.	Allow only dispersed camping within 200 feet of a water source, except where developed camping facilities currently exist. Monitor the Pine Creek Canyon riparian conditions and relocate camping use away from areas where resource damage is occurring.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – TRAVEL MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal LR:6 Provide access for resource and public use. **Objectives:** **LR:6.1** Conduct transportation planning to manage existing and new access. **LR:6.2** Manage existing access to balance public use, resource management, and human health and safety. **Goal LR:7** Manage existing access for resource and public use. **Objectives:** **LR:7.1** Manage existing access to balance public use, resource management, and human health and safety. **LR:7.2** Designate roads, trails, and areas as open, closed, and (or) limited to OHV use.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
6036	LR:6.1 LR:6.2 LR:7.1 LR:7.2	Allow for temporary closures to motorized vehicle use in areas on BLM-administered public lands that pose public health and safety risks, and (or) where damage to public land resources is imminent.			
6037	LR:6.1 LR:6.2 LR:7.1 LR:7.2	Reclaim all roads and two-track trails not needed for resource management purposes to their native condition.			
6038	LR:6.1 LR:6.2 LR:7.1 LR:7.2	Close unauthorized two-track roads causing resource damage (e.g., erosion, invasion of nonnative species, sensitive species habitat damage, and cultural resource damage).			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6039	LR:6.1 LR:7.2	No travel management planning will be done. No TMAs will be established.	Conduct travel management planning in compliance with the management decisions identified in this RMP. TMAs identified for completion of travel management plans when the record of decision is signed for this RMP: Pine Creek Canyon, Raymond Mountain WSA. TMAs identified for completion of travel management plans within five years of the ROD: Rock Creek/Tunp MA, Dempsey SRMA, and the Moxa Arch oil and gas development area. TMAs identified for completion of travel management plans within ten years of the	Same as Alternative B, except TMAs identified for completion of travel management plans within ten years of the ROD would include Leavitt Bench/Crooked Canyon area and Oakley Draw.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – TRAVEL MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			ROD: Bear River Divide Management Area (MA) and Slate Creek winter range area. The remaining field office area: TMAs will be identified and plans completed as funds become available.		
6040	LR:6.1 LR:7.2	No similar action.	Designated roads would not be upgraded. Any improvements to the roadways would require further analysis.	Same as Alternative B.	Same as Alternative B.
6041	LR:6.1 LR:6.2 LR:7.1 LR:7.2	No similar action.	Travel management planning in big game winter ranges will minimize open road density to meet an objective of less than ½ mile of open road per square mile.	Travel management planning would not make considerations for open road density.	Same as Alternative B, except an average of 2 miles of open road per square mile will not be exceeded.
6042	LR:6.2 LR:7.1	No specific measures are in place to protect special status plants from dust from unpaved roads.	Unpaved roads would not be allowed within ¼ mile of special status plant species populations.	Same as Alternative A.	New unpaved roads could be allowed within 250 feet of special status plant species populations only if under NEPA analysis the road would not adversely impact the species.
6043	LR:6.1 LR:7.2	No open use areas are identified for OHV use.	No open use areas will be allowed for OHV use.	The following areas are open for OHV use: part of the hill climb area in Section 33, T15 North, R114 West; the entire area east of Lyman (encompasses former chariot race area and parts of Sections 6, 7, 11, between I-80 and the frontage road), and the open area near south Lincoln County landfill. New proposals for open OHV use areas will be considered and could be approved provided they do not cause a significant impact to other resources.	The following areas are open for OHV use: the former chariot race area east of Lyman (80 acres between I-80 and the frontage road.) and part of the hill climb area in Section 33, T15 North, R114 West - 60 acres (see Map B). The following areas will be designated limited to existing roads and trails pending resource surveys and travel management planning to support an open designation: Oakley Draw and Leavitt Bench/Crooked Canyon New proposals for open OHV use areas will be considered and could be approved provided they do not cause a significant impact to other resources.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – TRAVEL MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6044	LR:6.1	Motor vehicle travel in the planning area, outside of the WSA, is limited to existing roads and trails. Limited off-trail motor vehicle travel is allowed for dispersed uses and to perform necessary tasks as long as it does not cause resource damage or create new trails. Motor vehicle travel is seasonally limited in the following crucial big game winter range areas: Slate Creek, Rock Creek, and Bridger Creek. Public access to the areas is closed from January 1 to April 30 (exemptions apply).	Motor vehicle travel is limited to crowned and ditched roads. Motor vehicle travel is seasonally limited in all crucial big game winter range areas. Public access to the areas is closed from November 15 to April 30 (exemptions apply).	Motor vehicle travel in the planning area, outside of the WSA, is limited to existing roads and trails. Limited off-trail motor vehicle travel is allowed for some dispersed uses and to perform necessary tasks as long as it does not cause resource damage or create new trails. Limited motor vehicle travel is allowed (up to ½ mile) off of existing roads and trails to perform necessary tasks. No seasonal closures would be implemented.	Same as Alternative A, except if off-road distances beyond 300 feet are required for dispersed uses or to perform necessary tasks, exceptions can be granted through a letter of authorization.
6045	LR:6.1 LR:7.2	Designated motor vehicle routes in the planning area are as follows: Interstate highways, state highways, signed and numbered county roads, and the following BLM roads: #4209 (Slate Creek), #4211 (Dempsey), #4213 (Smiths Fork), #4219 (South Fork Fontenelle), #4315 (Burnt Fork).	Same as Alternative A, except all crowned and ditched roads in the planning area are designated motor vehicle routes.	All existing roads and trails in the planning area are designated motor vehicle routes with the exception of the Raymond Mountain WSA.	Same as Alternative A, except designate as a new motor vehicle route the Pine Creek Canyon road from the end of Lincoln County Road #204 in T25N, R118W, Section 35 to the USFS boundary. Additional routes will be identified and designated upon completion of travel management plans.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – TRAVEL MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6046	LR:6.2 LR:7.1	Most of the Raymond Mountain WSA, (32,787 acres) is closed to motor vehicle use.	Close the Raymond Mountain WSA to motorized vehicles and OHV use. Close Green Hill (near town of Kemmerer) to motorized vehicle and OHV use. Close the trail to Commissary Ridge from the Commissary Ranch development (T24N, R116W, Sections 15, 20) to motorized vehicle and OHV use. Close the following NHT segment to motorized vehicle and OHV use: a ¼ mile segment of the Oregon/California trail on the west slope of the Bear River Divide. Close riparian and wetland areas to motor vehicle and OHV use except for designated road crossings. Close special status plant species populations to motor vehicle and OHV use.	Same as Alternative A.	Same as Alternative B.
6047	LR:6.2 LR:7.1	Mechanized vehicle use is allowed throughout the planning area on existing roads and trails, except the Raymond Mountain WSA is closed to mechanized vehicles.	Same as Alternative A.	Allow mechanized vehicle use on existing roads and trails throughout the planning area including the existing Raymond Canyon trail in the WSA.	Same as Alternative C.
6048	LR:6.1 LR:6.2 LR:7.1	Snow machine use in Pine Creek Canyon is limited to the groomed trail. Snow machine use is limited to available dates prior to January 1 in the following crucial big game winter range areas: Slate Creek, Rock Creek, Bridger Creek, and Raymond Mountain.	Same as Alternative A, except snow machine use is seasonally limited in all crucial big game winter range areas from November 15 to April 30 (exemptions apply).	The entire Pine Creek Canyon would be available for snow machine use. No seasonal limitations would be applied.	Same as Alternative A, except no snow machine use allowed in the Raymond Mountain WSA.
6049	LR:6.2 LR:7.1	The Raymond Mountain WSA is closed to snow machine use, except for Raymond Basin (6,673 acres). No current management decision for snow machine use exists for the cross-country ski trail.	The Raymond Mountain WSA is closed to snow machine use. The cross-country ski trail is closed to snow machine use.	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – TRAVEL MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6050	LR:6.2 LR:7.1 LR:7.2	In the planning area, 23 miles of groomed snow machine trail exists and will continue to be groomed. New snow machine trails are considered on a case-by-case basis.	Same as Alternative A, except no new snow machine trails would be developed in crucial big game winter range.	Same as Alternative A.	Same as Alternative A.

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal LR:8 Manage public lands and establish visual management objectives to minimize adverse impacts to the visual resources on the landscape. **Objectives:** **LR:8.1** Establish VRM classes in the planning area (refer to Glossary). **LR:8.2** Maintain the overall integrity of VRM classes, while allowing for modification and changes of those classes to meet other resource objectives.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
6051	LR:8.1 LR:8.2	Pursuant to Section 106 of NHPA and the State Protocol, case-by-case reviews for specific undertakings require analysis and assessments of effects of NHT settings beyond the distances specified above.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6052	LR:8.1 LR:8.2 HR:2.1 HR:2.2	Manage the planning area according to the current (BLM 1986a) VRM maps.	Manage the Raymond Mountain WSA as VRM Class I. Manage a 3-mile buffer for visual resources around all sensitive roads, NHTs, campgrounds, towns, and sites registered on the NRHP within the field office as VRM Class II, except the defined boundaries of the Pine Creek Ski Area and Lion's Club Park R&PP leases will be managed as Class III. Areas of high human disturbance and low visual stimulation are managed as VRM Class	Manage the planning area using existing VRM classes, except manage the Raymond Mountain WSA as Class I. Manage a 3-mile buffer area around high potential wind energy areas per National Renewable Energy Laboratory data as VRM Class IV.	VRM classes apply to BLM-administered lands and are designated as follows: VRM Class I area: Raymond Mountain WSA VRM Class II areas: A visual corridor extending up to 1 mile on either side of the Sublette Cutoff and the Slate Creek Cutoff north of U.S. Highway 189 and east of Slate Creek Ridge in consideration of NHT views. From Slate Creek Ridge (north of U.S.

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			IV. The remaining planning area is managed as VRM Class III.		Highway 189) west to SH 233 in considerations of NHTs, scenic roadways, and current high-quality scenery. The area of Oyster Ridge northeast of the town of Kemmerer in consideration of views from the town of Kemmerer. The northwest portion of the planning area north and east of U.S. Highway 30 (excluding the Raymond Mountain WSA and the industrialized area west of the town of Kemmerer). This area is defined in consideration of sensitive NHTs and cultural sites; scenic views from highways and Fossil Butte National Monument; scenic views from high recreational use areas (e.g., Pine Creek Ski Area) and current high-quality scenery. The Star Valley area in consideration of current high-quality scenery and views from sensitive highways. A visual corridor extending up to 1 mile on either side of the Oregon/California Trail in blocked federal lands south of U.S. Highway 30 and west of U.S. Highway 189 (Bear River Divide area). The federal sections containing high management level NHT segments, the federal section that contains the Bridger Antelope Trap, and select federal sections within 3 miles of the Bridger Antelope Trap that exist within the checkerboard land pattern. These areas are defined in consideration of sensitive NHTs and cultural resources and views from NHTs and cultural areas. The visual corridor for up to 3 miles on either side of SH 414 and County Road 283 in Uinta County in consideration of scenic roadway views. The visual corridor on federally administered lands extending up to 1 mile on either side of the Mormon-California-Pony Express Trail

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
					south of I-80 and east of Bigelow Bench in Uinta County. The area is defined in consideration of sensitive NHTs and cultural resources views. VRM Class III areas: The defined boundaries of the Pine Creek Ski Area and Lion's Club Park R&PP leases and those areas in the planning area not defined as VRM Class I, II, or IV. VRM Class IV areas: The area west of U.S. Highway 30 (north of the Highway 30/89 junction), also known as the Boundary Ridge, in consideration of wind-energy potential. The blocked federal lands southeast of SH 189 (excluding Oyster Ridge) to the checkerboard land pattern in consideration of higher energy development potential. The checkerboard land pattern north of I-80 (except the federal sections containing high management level NHTs segments, the federal section that contains the Bridger Antelope Trap, and select federal sections within 3 miles of the Bridger Antelope Trap) in consideration of public land manageability. The checkerboard land pattern south of I-80 and east of the eastern bench above Cottonwood Creek to the planning area east boundary in consideration of higher industrial and energy development potential. Class I – 32,807 acres Class II – 427,497 acres Class III –314,829 acres Class IV – 648,736 acres

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6053	LR:8.1 LR:8.2	The area within the viewshed of the Bridger Antelope Trap currently has no specific prescriptions and is managed according to the VRM class for the area.	Preserve the viewshed within 10 miles of the Bridger Antelope Trap juniper fence, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. The area is not suitable for ROW corridors or other developments containing high-profile structures (higher than 12 feet), particularly wind power.	Same as Alternative A.	Preserve the viewshed within 3 miles of the Bridger Antelope Trap juniper fence, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing projects in federal sections to retain the existing character of the landscape so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. The area is not suitable for ROW corridors or other developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] The management action is intended to manage developments to maintain setting qualities and not to have an exclusion zone.
6054	LR:8.1 LR:8.2	All significant historical, archeological, and cultural sites are protected or mitigated.	Preserve the viewshed within 10 miles of the sites listed below, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. The area is not suitable for ROW corridors or other developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres) Gateway petroglyphs	Same as Alternative A.	Preserve the viewshed within 3 miles of the sites listed below, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing projects in federal sections to retain the existing character of the landscape so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. ROW will be designed to preserve the visual integrity of the sites consistent with BLM visual resources handbook/manual. The area is not suitable for developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] The management action is intended to manage developments to maintain setting qualities and not to have an exclusion zone. Emigrant Spring/Slate Creek (87 acres) Emigrant Spring/Dempsey (11 acres) Johnston Scout Rock (2 acres) Alfred Corum and Nancy Hill emigrant gravesites (½ acre) Pine Grove emigrant camp (14 acres) Rocky Gap trail landmark (15 acres) Bear River Divide trail landmark (3 acres) Gateway petroglyphs (518 Acres)

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
6055	LR:8.1 LR:8.2 HR:2.1 HR:2.2	The objective will be to protect the trails from visual intrusion and surface disturbance and to maintain the integrity of setting. To provide a protective corridor for the trail, visual intrusion and surface disturbance generally will be restricted or prohibited within 1,320 feet from either side of an historic trail (may depend on topography and existing surface disturbance), or within the visual horizon of the trail, whichever is closer.	Manage the viewsheds of NHT segments as follows: (1) Preserve the viewshed within 10 miles of high management level segments, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the trail setting. Design ROW to preserve the visual integrity of the settings consistent with the BLM visual resources handbook and manual. The settings are not suitable for developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] (2) Preserve the viewshed within 5 miles of medium management level segments by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer. (3) Preserve the viewshed within ½ mile of low management level segments by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer.	Manage the viewsheds of NHT segments with project specific analysis to determine the level of restrictions within distances prescribed as follows: (1) Manage the viewshed to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the trail setting within 1 mile or the visual horizon of high management level segments where the visual characteristics of the setting are uncompromised by modern intrusions. (2) Manage the viewshed to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer within ¼ mile or the visual horizon of medium management level segments. (3) For low management level segments, manage the viewshed in accordance with the designated VRM Class.	Manage the viewsheds of NHT segments as follows: (1)(a) Preserve the viewshed within 3 miles of high management level segments north and east of U.S. Highway 30 and west of the Hams Fork river (Tunp/Dempsey Trail area), where the visual characteristics of the setting are uncompromised by modern intrusions, by managing projects in federal sections to retain the existing character of the landscape so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the trail setting. Design ROW to preserve the visual integrity of the settings consistent with the BLM visual resources handbook and manual. The settings are not suitable for developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] (1)(b) Preserve the viewshed within 1 mile of high management level segments outside of the Tunp/Dempsey Trail area and the checkerboard land pattern area, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing projects in federal sections to retain the existing character of the landscape so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the trail setting. Design ROW to preserve the visual integrity of the settings consistent with the BLM visual resources handbook and manual. The settings are not suitable for developments containing high-profile structures (higher than 12 feet), particularly wind power.[1] (1)(c) On high management level trail segments within the checkerboard land pattern area, manage the viewshed to preserve the existing character of the

Table 2-3. Detailed Table of Alternatives *(Continued)*

6000 LAND RESOURCES (LR) – VISUAL RESOURCE MANAGEMENT					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
					landscape within the federal section where the trail occurs. (2)(a)Preserve the viewshed within ½ mile of medium management level segments that exist in blocked federal lands west of U.S. Highway 189 (south of Kemmerer) and south of U.S. Highway 30 by managing projects in federal sections to retain the existing character of the landscape so developments do not attract the attention of the casual observer. (2)(b)On medium management level trail segments outside of the area described in (2)(a) manage the viewshed to preserve the existing character of the landscape within the federal section where the trail occurs. (2)(c) On low management level segments, manage the viewshed according to the appropriate VRM class for the area. The management action is intended to manage developments to maintain setting qualities and not to have an exclusion zone.

Table 2-3. Detailed Table of Alternatives *(Continued)*

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
		7000 SPECIAL DESIGNATIONS (SD)			
		Goal SD:1 Maintain and protect the integrity of unique resource values, preserve historic significance, and provide opportunity for other uses where appropriate. **Objective:** **SD:1.1** Identify areas for other management that possess unique resource values. Designate MAs for the life of the RMP (or as long as the unique resource value exists).			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
7001	SD:1.1	The Raymond Mountain WSA will continue to be managed in a manner that does not impair its suitability for preservation as wilderness unless/until the Congress determines otherwise. Until the Congress makes the final determination of the status of the WSA, the preservation of wilderness values is paramount and is the primary consideration when evaluating resource use proposals that may conflict with or be adverse to those wilderness values. (For additional information see BLM Manual Handbook H-8550-1 – Interim Management Policy for Lands Under Wilderness Review)			
		Areas of Critical Environmental Concern (ACECs)			
7002	SD:1.1	The Raymond Mountain ACEC plan will continue to be implemented.	Same as Alternative A.	The area within the current Raymond Mountain ACEC is no longer designated as an ACEC.	Same as Alternative A.
7003	SD:1.1	No similar action.	The Raymond Mountain Expansion Area is designated an ACEC to protect Bonneville cutthroat trout habitats.	The Raymond Mountain Expansion Area is not designated as an ACEC.	Same as Alternative C.
7004	SD:1.1	No similar action.	Designate special status plant species habitats as ACECs.	Special status plant communities are not designated as ACECs.	Special status plant species habitats may be designated as ACECs on a case-by-case basis.
7005	SD:1.1	No similar action.	Special status plant species populations designated as ACECs also are designated as RNAs.	Special status plant species populations designated as ACECs are not designated as RNAs.	Special status plant species populations designated as ACECs are not designated as RNAs.
7006	SD:1.1	No similar action.	Cushion plant communities are designated as ACECs.	Cushion plant communities are not designated as ACECs.	Cushion plant communities may be designated as ACECs on a case-by-case basis.
7007	SD:1.1	No similar action.	Cushion plant communities designated as ACECs are designated as RNAs.	Cushion plant communities designated as ACECs are not designated as RNAs.	Cushion plant communities designated as ACECs are not designated as RNAs.

Table 2-3. Detailed Table of Alternatives *(Continued)*

7000 SPECIAL DESIGNATIONS (SD)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
7008	SD:1.1	No similar action.	Designate selected BLM-administered lands in Sections 1, 2, 3, 4, 9, 10, 11, 12, 15, and 16 of T15N, R116W, and Section 7 of T15N, R115W (2,800 acres) as the Bridger Butte ACEC and manage for the preservation and enhancement of cultural, historical, and Native American values, as well as rare plant species that exist in the area. Manage the Bridger Butte ACEC (1,127 acres) according to the following prescriptions: Prohibit establishment of ROW corridors and wind-energy projects, as well as all surface-disturbing activities.[1] Close to OHV use and exclude from prescribed burns and vegetation treatments on BLM-administered lands within the ACEC boundary.	Manage lands in and around the Bridger Butte area in the same manner as adjacent BLM-administered lands.	Designate selected BLM-administered lands in Sections 10, 11, and 15 of T15N, R116W (720 acres) as the Bridger Butte ACEC and manage with the objective of preserving and enhancing cultural, historical, and Native American values, as well as rare plant species that exist in the area. Manage the Bridger Butte ACEC (727 acres) according to the following prescriptions: Prohibit establishment of ROW corridors and wind-energy projects, as well as all surface-disturbing activities. Close to OHV use on BLM-administered lands within the ACEC boundary.[1]
7009	SD:1.1	No similar action.	Designate white-tailed prairie dog complexes of 100 acres or greater as ACECs.	No white-tailed prairie dog ACECs are designated.	Same as Alternative C.
7010	SD:1.1	No similar action.	Designate the Dry Fork Watershed as an ACEC to protect Bonneville cutthroat trout and leatherside chub habitats.	The Dry Fork Watershed is not designated as an ACEC.	Same as Alternative C.
7011	SD:1.1	No similar action.	Designate the Upper Tributary Watershed as an ACEC to protect Bonneville cutthroat trout and leatherside chub habitats.	The Upper Tributary Watershed is not designated as an ACEC.	Same as Alternative C.
7012	SD:1.1	No similar action.	Designate the Lower Tributary Watershed as an ACEC to protect Bonneville cutthroat trout and leatherside chub habitats.	The Lower Tributary Watershed is not designated as an ACEC.	Same as Alternative C.
7013	SD:1.1	No similar action.	Establish an ACEC or other MA in Fossil Basin specifically for preservation and research of fossil resources.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

7000 SPECIAL DESIGNATIONS (SD)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
7014	SD:1.1	No similar action.	Manage the Rock Creek/Tunp area of significant resource concern with the objective of preserving and enhancing the critical wildlife habitats and cultural values that occur within the area. Manage the Rock Creek/Tunp area of significant resource concern with additional prescriptions as follows: (1) Close the area to all-new mineral leasing. (2) No mineral material sales and (or) free use permits are authorized. (3) Pursue withdrawals from locatable mineral entry. (4) Restrict all new ROW actions to existing utility corridors. (5) No new road developments are authorized. No new surface disturbance is allowed. (6) No new high-profile structures, including wind power facilities, are authorized. (7) Pursue opportunities to reclaim existing roads not necessary to attain management objectives. (8) Restrict OHV use to open roads. No off-trail travel is allowed without prior approval from the authorized officer. (9) Manage NHTs and sites settings, and all surface-disturbing activities to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. (10) Forage associated with newly acquired federal lands is not considered for livestock use. The grazing operator is held to the current federal active AUMs within existing allotments. (11) No salt licks or mineral supplements	Manage lands in and around the Rock Creek/Tunp area in the same manner as adjacent BLM-administered lands.	Manage the Rock Creek/Tunp area of significant resource concern with additional prescriptions as follows: (1) The area is administratively unavailable for all new fluid mineral leasing consideration; expired leases are not reissued. The area is administratively unavailable for solid leasable minerals for the life of the plan. (2) The area is available for mineral material sales and (or) free use permits. (3) The area is available for locatable mineral entry. (4) Restrict all new ROW actions to existing disturbance zones. (5) No net loss of habitat function allowed from any construction activity within the boundaries of the management area. Successful re-establishment or improvement of habitats could offset any new disturbance areas. (6) No wind-power facilities are authorized.[1] (7) Pursue opportunities to reclaim existing roads not necessary to attain management objectives. (8) Restrict OHV use to existing roads and trails. No off-trail travel is allowed without prior approval from the authorized officer. (9) Manage NHTs and sites settings, and all surface-disturbing activities to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. (10) Forage associated with newly acquired federal lands is available for livestock use.

Table 2-3. Detailed Table of Alternatives *(Continued)*

7000 SPECIAL DESIGNATIONS (SD)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			would be allowed within ½ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and significant cultural sites. (12) Develop and implement aggressive plans to control and eradicate noxious weed invasions. (13) Develop plant community objectives and continue to implement appropriate management to meet and maintain wildlife habitat needs.		(11) No salt licks or mineral supplements allowed within ¼ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and significant cultural sites. (12) INNS species are managed according to Partners Against Weeds. (13) Develop plant community objectives and continue to implement appropriate management to meet and maintain wildlife habitat needs.
7015	SD:1.1	No similar action.	Manage the Bear River Divide area of significant resource concern with the objective of preserving and enhancing the critical wildlife habitat, cultural values, and paleontological resources that occur within the area. Manage the Bear River Divide area of significant resource concern with additional prescriptions as follows: (1) Close the area to all new mineral leasing. (2) No mineral material sales and (or) free use permits are authorized. (3) Pursue withdrawals from locatable mineral entry. (4) Restrict all new ROW actions to existing utility corridors. (5) No new road developments are authorized. No new surface disturbance is allowed. (6) No new high-profile structures, including wind power facilities, are authorized. (7) Pursue opportunities to reclaim existing roads that are not necessary to attain management objectives. (8) Restrict OHV use to open roads. No off-trail travel is allowed without prior approval from the authorized officer.	Manage lands in and around the Bear River Divide area in the same manner as adjacent BLM-administered lands.	Manage the Bear River Divide area of significant resource concern with the objective of preserving and enhancing the critical wildlife habitats and cultural values that occur within the area. Manage the Bear River Divide area of significant resource concern with additional prescriptions as follows: (1) The area is administratively unavailable for new fluid mineral leasing on the currently unleased lands within the Bridger Creek/Twin Creek watersheds (see Map 64) (31,802 acres); lands currently leased can have new leases issued. The area is administratively unavailable for solid mineral leasing for the life of the plan. (2) The area is available for mineral material sales and (or) free use permits. (3) The area is available for locatable mineral entry. (4) Restrict all new ROW actions to existing disturbance zones. (5) Allow construction activities within the boundaries of the management area with the goal of no further loss of habitat function from these activities. Successful reestablishment or improvement of habitats could offset any new disturbance areas.

Table 2-3. Detailed Table of Alternatives *(Continued)*

7000 SPECIAL DESIGNATIONS (SD)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
			(9) Manage NHTs, sites settings, and all surface-disturbing activities to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. (10) Forage associated with newly acquired federal lands is not considered for livestock use. The grazing operator is held to the current federal active AUMs within existing allotments. (11) No salt licks or mineral supplements are allowed within ½ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and significant cultural sites. (12) Develop and implement aggressive plans to control and eradicate noxious weed invasions. (13) Develop plant community objectives and continue to implement appropriate management to meet and maintain wildlife habitat needs. (14) Proactively study and inventory the vertebrate fossil resources through paleontologic inventory by qualified paleontologists of the portion of Fossil Basin inside the management area. Significant sites are subject to further study, possibly including excavation, collection, and curation of fossils. (15) Protect important paleontologic sites by not allowing surface disturbance at the sites, except disturbance in support of scientific research. In support of this, management prescriptions could include increased use of BLM law enforcement. (16) Complete a paleontology management plan for the management area to further scientific study and public education opportunities in the area.		(6) No wind-power facilities are authorized.[1] (7) Pursue opportunities to reclaim existing roads not necessary to attain management objectives. (8) Restrict OHV use to roads and trails. No off-trail travel is allowed without prior approval from the authorized officer. (9) Manage NHTs, sites settings, and all surface-disturbing activities to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. (10) Forage associated with newly acquired federal lands is available for livestock use. (11) No salt licks or mineral supplements are allowed within ¼ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and significant cultural sites. (12) INNS species are managed according to Partners Against Weeds. (13) Develop plant community objectives and continue to implement appropriate management to meet and maintain wildlife habitat needs. (14) A paleontologic inventory will be made on project specific basis for mitigating paleontologic resources or as research permits are issued. (15) Surface disturbance is allowed with mitigation of paleontologic sites if necessary. (16) Do not complete comprehensive paleontologic management plans at this time.

Table 2-3. Detailed Table of Alternatives *(Continued)*

		7000 SPECIAL DESIGNATIONS (SD)			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Wild and Scenic Rivers			
7016	SD:1.1	Manage the thirteen eligible waterway segments to protect the free-flowing, outstandingly remarkable values and tentative classification. Conduct a case-by-case review of proposed actions in eligible waterway segments and apply protective management, subject to valid existing rights. Eligible waterways include the following: • Bear River • Blacks Fork river • Bridger Creek Unit • Coal Creek • Dempsey Creek • Emigrant Creek • Fontenelle Creek • Hams Fork • Huff Creek • Pine Creek Unit • Raymond Creek Unit • Slate Creek • Smiths Fork river See Chapter 2 of the WSR report (Jonas Consulting 2002) for a complete description of the above waterway segments.	Recommend all thirteen eligible waterways as suitable for inclusion in the National Wild & Scenic Rivers system. Apply protective management based on case-by-case review.	Recommend none of the thirteen eligible waterways as suitable for inclusion in the National Wild & Scenic Rivers system. Manage these areas the same as adjacent federal lands.	Recommend the following two waterways for inclusion in the National Wild & Scenic Rivers system: • Huff Creek – Scenic, fisheries, and wildlife values; unique land and resource diversity. • Raymond Creek – Scenic, recreational, fisheries and wildlife values; unique land and resource diversity. The remaining eleven waterway segments are recommended not to be included in the National Wild and Scenic Rivers system. Apply management to protect the values listed for Huff Creek and Raymond Creek.

Table 2-3. Detailed Table of Alternatives *(Continued)*

7000 SPECIAL DESIGNATIONS (SD)					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Wilderness Study Areas			
7017	SD:1.1	No similar action.	If Congress acts on the designation, and the Raymond Mountain is not selected as wilderness, continue to manage the land area within the current boundary under the interim management plan.	If Congress acts on the designation, and the Raymond Mountain is not selected as wilderness, the land area within the current boundary would be managed in the same manner as adjacent BLM-administered lands.	If Congress acts on the designation, and the Raymond Mountain is not selected as wilderness, manage the land area within the current boundary of the Raymond Mountain WSA under the interim management plan until a new management plan for the area is prepared and the RMP is amended.
		Back Country Byways			
7018		No similar action.	Develop a route from Kemmerer over the Dempsey Ridge to Fossil Butte and back to Kemmerer in cooperation with Lincoln County, the NPS, and the State of Wyoming. Designate this route a primitive, back country byway including 4.5 miles of primitive two-track road and 11 miles of crowned and ditched gravel road. Manage with the objective of encouraging responsible motorized recreational use of the proposed byway, while protecting the scenic, cultural, and critical wildlife habitat values that occur in the area.	A scenic back country byway is not developed.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives *(Continued)*

8000 SOCIOECONOMIC RESOURCES (SR) – HEALTH AND SAFETY					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal SR:1 Reduce risk to health and safety from geologic hazards on BLM-administered lands within the planning area. **Objectives:** **SR:1.1** Reduce or eliminate geologic hazards on BLM-administered lands within the planning area, where possible. **SR:1.2** Inventory, assess, and manage geologic hazards on BLM-administered lands within the planning area. **SR:1.3** Reduce or eliminate hazards from abandoned mines on BLM-administered lands within the planning area, where possible. **Goal SR:2** Reduce or minimize risk to humans and the environment from hazardous materials on BLM-administered lands within the planning area. **Objective:** **SR:2.1** Reduce potential threats to public health and safety on BLM-administered lands within the planning area, where possible.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
8001	SR:2.1	Hazardous materials are managed to reduce the risk to visitors and employees, to restore contaminated lands, and to carry out emergency response activities, as per appropriate laws, policies, and regulations.			
8002	SR:1	The area within 10,000 feet of any municipal airport runways is restricted by FAA FAR Part 77 to protect the airport airspace.			
8003	SR:2	The area underlying any municipal airport runway is a zone of No Surface Occupancy.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
8004	SR:1.1 SR:1.2 SR:1.3	Inventory, assess, and mitigate geologic hazards as they are discovered within the analysis area.	Conduct full inventory (1.4 million acres) to identify all geologic hazards. Develop a database of high, medium, and low hazards.	Catalog and develop mitigation measures for any proposed developments as geologic hazards are discovered.	Same as Alternative C.
8005	SR:1.1 SR:2.1	Activities in areas of known geologic hazards will be restricted.	Prohibit activities that are known to cause or accelerate geologic hazards.	Restrict development within areas of known geologic hazards by requiring adequate engineering design to address particular hazards.	Same as Alternative C.
8006	SR:2.1	Comply with requirements of Onshore Order #6 for H_2S plans.	Prohibit new H_2S wells within 2 miles of the following areas: towns, cities, and designated campgrounds.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives *(Continued)*

8000 SOCIOECONOMIC RESOURCES (SR) – SOCIAL AND ECONOMIC CONDITIONS					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
		Goal SR:3 Provide opportunities for economic and social sustainability at the national, regional, and local level. **Objectives:** **SR:3.1** Provide opportunities on BLM-administered lands within the planning area that would be in accordance with the national energy plan and that also consider the importance of economic and social sustainability at the local level. **SR:3.2** Use decision review processes that include considerations of various potential impacts of decisions of BLM and all other institutions that potentially impact the planning area, including housing, employment, population, fiscal impacts, social services, cultural character, and municipal utilities.			
		MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES			
		None Identified.			
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
8007	SR:3.1	No specific management with regard to socioeconomic resources was identified in the 1986 RMP (BLM 1986a).	Minimize the reliance on the national energy plan in all Kemmerer Field Office land use planning and focus on the diversification of the local economy by, for example, stressing recreation, grazing, and renewable energy. Quantify the impacts associated with site-specific and programmatic actions for the purpose of considering the impacts of proposed actions on local governments. Provide information to local governments as required by law. Develop a strategy for mitigating the impacts by coordinating with local governments and impacted parties.	Support the national energy plan by quantifying the impacts associated with meeting those goals without regard to mitigating the socioeconomic impacts. Provide information to local governments as required by law.	Incorporate the national energy plan into Kemmerer Field Office land use planning while also considering the socioeconomic goals and objectives identified by the overlapping jurisdictions. Support national energy plans regarding development of renewable energy sources. Quantify the impacts associated with site specific and programmatic actions for the purpose of considering the impacts of proposed actions on local governments.

Table 2-3. Detailed Table of Alternatives *(Continued)*

8000 SOCIOECONOMIC RESOURCES (SR) – SOCIAL AND ECONOMIC CONDITIONS					
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D (Preferred Alternative)**
8008	SR:3.2	No specific management with regard to socioeconomic resources was identified in the 1986 RMP (BLM 1986a).	Make socioeconomic considerations a priority in the decision-making processes. For example, consider the economic and social impacts identified by overlapping jurisdictions when making resource allocation decisions. Require the mitigation of socioeconomic impacts, such as mitigating the infrastructure impacts associated with the influx of a temporary workforce that is only associated with the exploration, development, and construction phases of substantial increased activity in the oil and gas sector, as a condition of the resource decision itself. Incorporate local governments as cooperating agencies for any proposed land use action. Provide information to local governments as required by law.	Work with local governmental officials to quantify the impacts associated with site specific and programmatic actions for the purpose of providing that information to the affected parties and overlapping jurisdictions as required by law.	Work with local governmental officials to quantify the impacts associated with site specific and programmatic actions for the purpose of considering the impacts of proposed actions on local governments.

[1] This action is equivalent to a ROW exclusion area.
Notes: Based upon the programmatic and strategic nature of the RMP alternatives, this table reflects the potential for environmental consequences.

AAQS	ambient air quality standards
ACEC	Area of Critical Environmental Concern
AMR	appropriate management response
APD	application for permit to drill
AQD	Air Quality Division
AQRV	Air Quality Related Value
AUM	animal unit month
BLM	Bureau of Land Management
BR	biological resources
CBNG	coalbed natural gas
CCF	hundred cubic feet
CFR	Code of Federal Regulations
CSU	controlled surface use
dB	decibel
DEQ	Department of Environmental Quality
DLE	Desert Land Entry
EPA	U.S. Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FLPMA	Federal Land Policy and Management Act
FM	fire and fuels management
H_2S	hydrogen sulfide
I-80	Interstate Highway 80
IMP	Interim Management Policy for Lands Under Wilderness Review
INNS	invasive nonnative specie
LAC	level of acceptable change
LBA	Lease By Application
LOC	level of concern
LR	land resources
MBF	thousand board feet
MMBF	million board feet
MMTA	Mechanically Mineable Trona Area
MR	mineral resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NPS	National Park Service
NRHP	National Register of Historic Places
NSO	no surface occupancy
NSS	Native Species Status
Obj.	objective
OHV	Off-highway vehicle
pH	potential of hydrogen
PR	physical resources
PSD	prevention of significant deterioration
R	range
R&PP	Recreation and Public Purposes
RMP	Resource Management Plan
RNA	Research Natural Area
ROD	Record of Decision
ROW	rights-of-way
SD	Special Designations
SH	state highway
SIP	State Implementation Plan
MA	Management Area
SRP	Special Recreation Permit
SR	socioeconomic resources
SRMA	Special Recreation Management Area
T	township
TMA	Travel Management Area
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
WSA	Wilderness Study Area
WGFD	Wyoming Game and Fish Department

2.6 Summary of Environmental Consequences by Alternative

Table 2-4 (Summary of Environmental Consequences by Alternative) summarizes potential meaningful impacts anticipated from activities within the Kemmerer planning area by alternative. Where applicable, potential impacts anticipated from BLM actions are quantified. For example, a greater acreage implies a greater impact (either beneficial or adverse). For those resources and resource uses where potential impacts are qualitative, a relative narrative comparison among alternatives is provided. A more detailed comparison of impacts between alternatives is summarized in the conclusion for each resource section in Chapter 4. Cumulative impacts from non-BLM actions are described in Chapter 4 but are not included in Table 2-4.

The environmental consequences of alternatives are not anticipated to exceed known legal thresholds or standards over the life of the plan. Standard practices, BMPs, and guidelines for surface disturbing activities are built into each alternative to avoid and minimize potential impacts. Mitigation of residual impacts will be considered during subsequent implementation decision plans and any associated environmental analyses conducted at that time. Reclamation will be applied to surface disturbance under all alternatives to reduce the amount of long-term impact.

Table 2-4. Summary of Environmental Consequences by Alternative

Resources	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Air Quality				
NAAQS	Low Potential	Lowest Potential	Low Potential	Low Potential
WAAQS	Low Potential	Lowest Potential	Low Potential	Low Potential
PSD Increments[1]	Potential	Lowest Potential	Potential	Potential
Visibility[1]	Potential	Lowest Potential	Potential	Potential
Atmospheric Deposition[1]	Potential	Lowest Potential	Potential	Potential
Soil and Water				
Groundwater Impacts	Potential	Lowest Potential	Potential	Potential
Produced Water Impacts	Potential	Lowest Potential	Potential	Potential
Acres of Surface Disturbance Anticipated	214,120 short-term/ 144,673 long-term	106,175 short-term/ 47,693 long-term	172,967 short-term/ 144,467 long-term	147,262 short-term/ 77,541 long-term
Average Annual Acre-Feet of Water Depletion in Planning Area from BLM Actions	96.9	59.1	97.7	96.9
Exceed Water Quality Standards	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Minerals				
Acres of Federal Mineral Estate Administratively Available for Oil and Gas Leasing Subject to Standard Lease Form Only	261,564	13,796	265,414	64,171
Acres of Federal Mineral Estate Administratively Available for Oil and Gas Leasing Subject to Moderate Constraints	844,554	103,704	860,249	1,042,502
Acres of Federal Mineral Estate Administratively Available for Oil and Gas Leasing Subject to Major Constraints	368,427	751,804	348,882	290,973
Acres of Federal Mineral Estate Administratively Unavailable for Oil and Gas Leasing	104,817	710,058	104,817	181,716
Acres of BLM-Administered Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Greater Sage-Grouse CSU	Surface: 0 Mineral Estate: 0	Surface: 46,598 Mineral Estate: 44,138	Surface: 0 Mineral Estate: 0	Surface: 0 Mineral Estate: 0

Table 2-4. Summary of Environmental Consequences by Alternative *(Continued)*

Resources	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Acres of BLM-Administered Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Raptor Nests CSU	Surface: 0 Mineral Estate: 0	Surface: 55,377 Mineral Estate: 55,677	Surface: 8,648 Mineral Estate: 8,716	Surface: 0 Mineral Estate: 0
Acres of BLM-Administered Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Prairie Dog Restrictions	Surface: 0 Mineral Estate: 0	Surface: 7,174 Mineral Estate: 7,135	Surface: 0 Mineral Estate: 0	Surface: 0 Mineral Estate: 0
Acres of BLM-Administered Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Trails NSO	Surface: 0 Mineral Estate: 0	Surface: 4,017 Mineral Estate: 4,627	Surface: 77 Mineral Estate: 77	Surface: 77 Mineral Estate: 77
Acres of BLM-Administered Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Floodplain NSO	Surface: 0 Mineral Estate: 0	Surface: 70,058 Mineral Estate: 70,895	Surface: 0 Mineral Estate: 0	Surface: 0 Mineral Estate: 0
Percent reduction in Total Wells From Baseline (1,221 wells)/ Projected Number of Federal Wells Drilled	17% (1,012)	50% (608)	16% (1,020)	17% (1,010)
Acres of Haystack Coal Lease By Application Acceptable for Further Leasing Consideration	3,963	0	3,963	3,963
Acres of Federal Mineral Estate Withdrawn from Locatable Mineral Entry	Unknown	940,220	0	4,572
Acres of Federal Mineral Estate Withdrawn from Locatable Mineral Entry for Cokeville Meadows	Not Identified	3,056	3,056	3,056
Acres of Federal Mineral Estate Not Available for New Sodium Exploration and Leasing	32,880	32,880 plus Viewsheds of Fossil Butte National Monument and Incorporated Towns and Cities	32,880	32,880
Acres of Federal Mineral Estate Not Available for New Phosphate Exploration and Leasing	32,880	32,880 Plus Viewsheds of Fossil Butte National Monument and Incorporated Towns and Cities	32,880	32,880
Acres of Federal Mineral Estate Not Available for Mineral Material Sales and (or) Free Use Permits	0	32,880 Plus Viewshed of Fossil Butte National Monument, Within ½ Mile of Developed Campgrounds, and In Areas with Special Status Plant or Wildlife Species	0	32,880 Plus Areas with Special Status Plant Species
Vegetation				
Fragmentation of Habitat	Highest Potential	Lowest Potential	Potential	Potential
Riparian/Wetland				
Wetland Impacts	Potential	Lowest Potential	Potential	Potential
Wetland Permit Required	Potential	Lowest Potential	Potential	Potential
Floodplain Impacts	Potential	Lowest Potential	Potential	Potential

Table 2-4. Summary of Environmental Consequences by Alternative *(Continued)*

Resources	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Fish and Wildlife				
Restrictions on Wildlife Movement	Highest Potential	Lowest Potential	Potential	Potential
Special Status Species				
Adverse Effects to ESA Species within the Planning Area	Anticipated	Anticipated	Anticipated	Anticipated
Critical Habitat Impacts	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Heritage				
Potential to Impact Eligible/Listed Cultural Sites and Paleontological Localities	Potential	Lowest potential	Potential	Potential
OHV Use				
Acres Open to OHV Use	0	0	2,791	159
Acres Closed to OHV Use	32,787	33,924	32,787	33,036
Livestock Grazing				
AUMs Projected/Change from Baseline (157,249)	15,556 10% decrease	5,128 3% decrease	15,534 9% decrease	8,338 5% decrease
Special Designations				
Acres of Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Bear River Divide ACEC	Mineral Estate: 0	Mineral Estate: 11	Mineral Estate: 0	Mineral Estate: 28
Acres of Surface/Federal Mineral Estate with High Oil and Gas Development Potential Impacted by Fossil Basin ACEC	Mineral Estate: 0	Mineral Estate: 8,458	Mineral Estate: 0	Mineral Estate: 0
National Historic Trails				
Potential to Impact NHTs	Potential	Lowest potential	Potential	Potential

Notes: Based upon the programmatic and strategic nature of the RMP alternatives, this table reflects the potential for environmental consequences. Administratively unavailable to leasing means deferred from leasing for the life of the plan.
[1] These impacts are anticipated to occur outside the planning area.

ACEC Area of Critical Environmental Concern
AQRV Air Quality Related Value
AS Administered Surface
AUM animal unit month
BLM Bureau of Land Management
CSU controlled surface use
CWR Crucial Winter Range
ESA Endangered Species Act
FME federal mineral estate
MA Management Area
N/A Not Applicable
NAAQS National Ambient Air Quality Standards
NHT National Historic Trail
NSO No Surface Occupancy
OHV off-highway vehicle
PSD prevention of significant deterioration
WAAQS Wyoming Ambient Air Quality Standards

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CHAPTER 3
AFFECTED ENVIRONMENT

Roadmap to Chapter 3

Chapter 3 discussions are grouped by general resource topics as outlined below.

Overview of the Planning Area (Page 3-1)

- Lincoln County
- Uinta County
- Sweetwater County
- Sublette County

3.1 Physical Resources (Page 3-4)

- Air Quality
- Soil
- Water

3.2 Mineral Resources (Page 3-20)

- Locatable
- Leasable
  - Oil and Gas
  - Coal
  - Sodium (Trona)
  - Other Solid Leasables
- Salable

3.3 Fire and Fuels Management (Page 3-37)

- Unplanned/Wildland Fire
- Planned/Prescribed Fire
- Stabilization and Rehabilitation

3.4 Biological Resources (Page 3-42)

- Vegetation
  - Forests, Woodlands, and Forest Products
  - Grassland and Shrubland Communities
  - Riparian and Wetland Communities
- Fish and Wildlife Resources
  - Fish
  - Wildlife
- Special Status Species
  - Plants
  - Fish
  - Wildlife
- Invasive Nonnative Species

3.5 Heritage Resources (Page 3-90)

- Cultural Resources
- Native American Concerns
- Tribal Treaty Rights and Trust Responsibilities
- Paleontological Resources

3.6 Land Resources (Page 3-106)

- Lands and Realty
- Renewable Energy
- Rights-of-Way and Corridors
- Livestock Grazing Management
- Recreation
- Travel Management
- Off-Highway Vehicles (OHV)
- Visual Resources Management

3.7 Special Designations (Page 3-129)

- Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas
- Wild and Scenic Rivers
- Wilderness Study Areas
- Back Country Byways

3.8 Socioeconomic Resources (Page 3-142)

- Social Conditions
- Economic Conditions
- Health and Safety
- Environmental Justice

CHAPTER 3
AFFECTED ENVIRONMENT

Chapter 3 describes existing conditions for Bureau of Land Management (BLM) resource programs, resource uses, special designations, and the socioeconomic environment within the Kemmerer Field Office planning area (planning area). Management of resources and resource uses on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements as summarized in Chapter 1. The Kemmerer Field Office operates under these applicable requirements and guidance. The Kemmerer Field Office also considers Best Management Practices (BMPs) in the management of resources and resource uses in the planning area.

In addition to describing existing conditions, Chapter 3 identifies, where appropriate, management challenges for resource programs and resource uses on BLM-administered land. These management challenges were identified by the BLM's Management Situation Analysis (MSA), as well as by issues identified during the scoping process for revising the 1986 Kemmerer Resource Management Plan (RMP) (BLM 1986a). By describing existing conditions for resource programs in the planning area, this chapter serves as the baseline against which the impacts of the different alternatives are analyzed and compared in Chapter 4.

Overview of the Planning Area

The planning area comprises 1,424,005 acres of BLM-administered surface land and 1,579,362 acres of BLM-administered mineral estate in Lincoln, Uinta, Sweetwater, and Sublette counties in southwestern Wyoming (see Maps 1 and 2 in Volume 2). Within Lincoln County, large contiguous areas of BLM-administered lands are intermingled with state, private, and small parcels of other federal surface (Bureau of Reclamation and U.S. Fish and Wildlife Service) lands. Southeastern Lincoln County, most of Uinta County, and most of the planning area lands in Sweetwater County are affected by the "checkerboard" land ownership pattern. There are no Kemmerer Field Office BLM-administered surface lands in Sublette County.

The planning area encompasses the intersection of two physiographic regions—the Wyoming Basin to the southeast and the Middle Rocky Mountains to the north and west. The Wyoming Basin comprises broad intermountain basins interrupted by isolated hills and low mountains that merge to the south into a dissected plateau. The Wyoming Basin is a shrubsteppe area, dominated by sagebrush and shadscale, interspersed with areas of shortgrass prairie. Higher elevations are in mountain shrub vegetation, with coniferous forest atop the highest areas. The Middle Rocky Mountains area generally is made up of complex mountains with many intermontane basins and plains. Elevations in the planning area range from approximately 6,070 feet above mean sea level (msl) at the eastern extent of the planning area in Sweetwater County to approximately 10,770 feet above msl at Rock Lake Peak in the Salt River Range in northern Lincoln County. The planning area generally has a dry, windswept, rain-shadow climate like much of Wyoming, but the variations in elevation have a substantial effect on vegetation types and suitability of areas for agriculture and grazing. The region generally has cold winters and dry summers below mountain slopes and cool summers and snowy winters in mountainous environments (Pitcher 1997).

The planning area includes portions of three regional watersheds—the Green River, Bear River, and Snake River basins. The northern two-thirds of the planning area are characterized by the parallel Salt River Range and the Wyoming Range, which trend generally from north to south. A series of major ridges extend the Wyoming Range to the south, including Commissary Ridge, Oyster Ridge, and the Hogsback. The Salt River Range extends to the south in a series of ridges, the most prominent of which

are the Tunp Range and the Sillem Ridge, portions of which are popularly known as the Bear River Divide. The extreme southern portion of the planning area includes foothills of the Uinta Mountains, which is an east-to-west trending mountain range mostly in northeastern Utah. To the east and northeast of the Uinta foothills is the Bridger basin, a southwestern extension of the Green River basin.

The climate of the planning area is classified as semiarid with areas of mid-latitude highland (Trewartha and Horn 1980; Martner 1986). A semiarid continental climate is characterized by seasonal variations in temperature (cold winters and warm summers) and precipitation levels that are low, but sufficient for the growth of short, sparse grass. Average maximum summer temperatures are 81-degrees Fahrenheit (ºF), while average minimum winter temperatures are 4.5 ºF.

Soils in the planning area are diverse and can vary in characteristics over relatively short distances. Soils and vegetation in the planning area generally provide rangeland suitable for year-round cattle and sheep grazing.

Agricultural production is an important contributor to the planning area's economy. Livestock grazing includes the grazing of domestic animals (e.g., cattle, sheep, horses, and goats) in the planning area. The public lands are often intermingled with private and state lands, which are grazed as one unit. Crops in the planning area may include wheat, oats, barley, alfalfa, grass hay, and pasture.

A variety of wildlife species occur in the planning area due to the diversity of habitats and landscapes which provide important areas for meeting all life requirements including breeding, foraging, migration, and winter range. Numerous and diverse wildlife populations are an indicator of the health of the land and environment.

A broad spectrum of outdoor opportunities within the planning area provide visitors the freedom of recreational choice. Recreational activities within the planning area include, but are not limited to, sightseeing, touring, photography, wildlife viewing, floating, mountain biking, camping, fishing, and hunting. The economy of the region is enhanced by wildlife-watching tourists, hunting, and fishing.

Since the mid-1800s, the mining industry has been a key driver in economic growth and development in the region. Coal, oil, natural gas, and trona are the most important mineral commodities in terms of employment and income, but other minerals (e.g., clay, phosphate, sand and gravel, building stone, and decorative stone) have played and continue to play a role in the development of the area.

Lincoln County

Lincoln County was established in 1911, the same year Kemmerer, Wyoming was named as the county seat. Pioneers traveling west in the mid to late 1800s generally followed the Oregon Trail. Early settlers established homesteads in the area in the late 1800s and large ranches of sheep and cattle took advantage of the vast rangeland. Extensive ranch settlement in the region followed the construction of the Union Pacific Railroad (UPRR) around 1867. Coal deposits at Kemmerer brought about its settlement in 1881. Kemmerer now boasts the largest open pit coal mine in the world.

State highways 30 and 189 are the main roads through Lincoln County and both connect Kemmerer with Interstate Highway 80 (I-80). State highway 30 bisects the planning area as it generally traverses east-west through the county, including the town of Kemmerer. State highway 89, in the northern portion of the planning area, runs through the towns of Afton and Alpine.

Three important rivers pass through Lincoln County: the Bear River, Snake River, and Green River. The Bear River flows into the Great Salt Lake. The Snake River, which originates in Yellowstone National Park, crosses the northern tip of the county and joins the Columbia River before flowing into the Pacific

Ocean. The Green River, which passes the eastern border of the county, flows southward into Utah, where it joins the Colorado River. Fontenelle Reservoir, created on the Green River system, is located in Lincoln County and primarily surrounded by Bureau of Reclamation lands.

Lincoln County comprises approximately 2,274,285 surface acres in the planning area, of which the BLM administers approximately 834,888 acres. In addition, BLM administers approximately 922,700 acres of federal mineral estate in Lincoln County.

Uinta County

Uinta County was established in 1869, the same year Evanston, Wyoming was named as the county seat. Early explorers traveled west along the Oregon Trail. Fort Bridger, the oldest settlement in the county, was an important trading post on the Oregon Trail, located in a valley on the Blacks Fork River. Agriculture and energy production continue today as the primary economic commodities in Uinta County.

I-80 generally traverses east-west through Uinta County. State highway 189 traverses north from I-80 between Evanston and Lyman toward Kemmerer.

The Upper Bear River watershed drains the western portion of Uinta County. The Upper Green River watershed drains the central and eastern portions of the county.

Uinta County comprises approximately 1,237,489 surface acres in the planning area, of which the BLM administers approximately 404,785 acres. In addition, the BLM administers approximately 489,269 acres of federal mineral estate in the county.

Sweetwater County

Sweetwater County was established in 1867, the same year Green River, Wyoming was named as the county seat. Several emigrant trails passed through the county including the Oregon, California, Mormon, Overland, and Cherokee trails. In addition, the transcontinental railroad came in 1868, creating two major population centers—Green River and Rock Springs. Agriculture remains an important economic commodity in Sweetwater County, as do mineral commodities such as coal and trona.

I-80 traverses east-west through Sweetwater County. State highway 30 traverses northwest from I-80 near Granger to Kemmerer. The Upper Green River watershed which drains all of Sweetwater County is located in the planning area. The Seedskadee National Wildlife Refuge is located in Sweetwater County and is primarily surrounded by Bureau of Reclamation lands.

Sweetwater County comprises approximately 405,604 surface acres in the planning area, of which the BLM administers approximately 184,143 surface acres. In addition, the BLM administers approximately 167,172 acres of federal mineral estate in Sweetwater County.

Sublette County

Sublette County was established in 1921, the same year Pinedale, Wyoming was named as the county seat. Sublette County comprises approximately 13,187 surface acres in the planning area. No BLM-administered surface lands in Sublette County occur within the planning area. Federal mineral estate in Sublette County occurs under U.S. Forest Service (USFS) jurisdiction.

3.1 Physical Resources

Physical resources in the planning area include air quality, soil, and water. Each of the three resource sections includes a description of the resource, the current condition of the resource, management challenges where appropriate, and management actions.

3.1.1 Air Quality

This section describes the climate and existing air quality in the Kemmerer RMP Study Area, the area potentially affected by activities in the Kemmerer RMP planning area. Air pollutants addressed in this Environmental Impact Statement (EIS) include criteria pollutants, hazardous air pollutants (HAPs), and compounds that could cause visibility impairment or atmospheric deposition.

Regional air quality is influenced by the interaction of several factors, including meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants.

Climate

The planning area is classified as having a semiarid continental climate with areas of mid-latitude highland (Trewartha and Horn 1980; Martner 1986). A semiarid continental climate is characterized by seasonal variations in temperature (cold winters and warm summers) and precipitation levels that are low, but sufficient for the growth of short, sparse grass. Table 3-1 summarizes the components of climate that could impact air quality in the planning area.

Table 3-1. Summary of the Climate in the Kemmerer Planning Area

Climate Component	Description
Temperature[1]	Average daily maximum July temperature: 80.9 ^{o}F Average daily minimum January temperature: 4.5 ^{o}F Mean maximum temperature: 53.6 ^{o}F Mean minimum temperature: 23.6 ^{o}F
Precipitation[1]	Mean annual precipitation: 9.78 inches Mean annual snowfall: 50.9 inches Mean winter snow depth: 2 inches
Winds[2]	Mean annual wind speed: 10.5 miles per hour Prevailing wind direction: southwest

Source: Western Regional Climate Center 2006a, 2006b, 2006c
[1] Measured at Kemmerer water treatment plant
[2] Measured at Evanston airport
BLM Bureau of Land Management
^{o}F degrees Fahrenheit

Existing Air Quality

Components of air quality addressed in this EIS include concentrations of air pollutants, visibility, and atmospheric deposition, as follows:

- Air pollutant concentration is an indicator of breathable, healthy air.
- Visibility is an indicator of the ability to see the surrounding landscape.
- Atmospheric deposition is an indicator of the health of terrestrial and aquatic ecosystems.

Air quality in the study area generally is considered to be good based on the limited amount of air quality monitoring currently being conducted in the area. The planning area has no regions that are designated as non-attainment for National Ambient Air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS).

Concentrations

Pollutant concentration refers to the mass of pollutant present in a volume amount of air and can be reported in units of micrograms per cubic meter, parts per million, or parts per billion.

The most recent representative ambient air quality data available for nitrogen dioxide (NO_2) and ozone is from the Green River Basin Visibility Study site in Sweetwater County (about 20 miles southwest of Farson). Other data have been reported since 2004 from the Jonah oil and gas field that show NO_2 and sulfur dioxide (SO_2) in compliance, with elevated ozone levels but no violations of the NAAQS or the WAAQS. The planning area has no regions designated as non-attainment for NAAQS or WAAQS.

Figure 3-1 shows the PM_{10} (particulate matter less than 10 microns in diameter) data collected over the last 11 years at the closest state and local air monitoring station to the planning area, which is located in Rock Springs, Wyoming. The data are shown for both the 24-hour and annual averages as a percent of the respective NAAQS. The BLM supports ambient air quality monitoring programs within Wyoming for criteria pollutants, visibility, and air quality-related values in Class I pristine areas.

Visibility

Several national parks, wilderness areas, and national monuments exist in the region. Table 3-2 presents a list of these areas relative to the planning area. Grand Teton National Park is the closest Class I area to the north of the planning area; the Bridger Wilderness Area is the closest Class I area to the east.

Table 3-2. National Parks, Wilderness Areas, and National Monuments in the Vicinity of the Kemmerer Planning Area

Areas	Closest Distance to the Kemmerer Planning Area (miles)	Direction from the Kemmerer Planning Area	Clean Air Act Status of the Area
Grand Teton National Park	30	North	Class I
Bridger Wilderness Area	40	East	Class I
Teton Wilderness Area	50	North	Class I
Fitzpatrick Wilderness Area	60	East	Class I
Washakie Wilderness Area	70	Northeast	Class I
Yellowstone National Park	70	North	Class I
North Absaroka Wilderness Area	100	Northeast	Class I

Source: NPS 2006

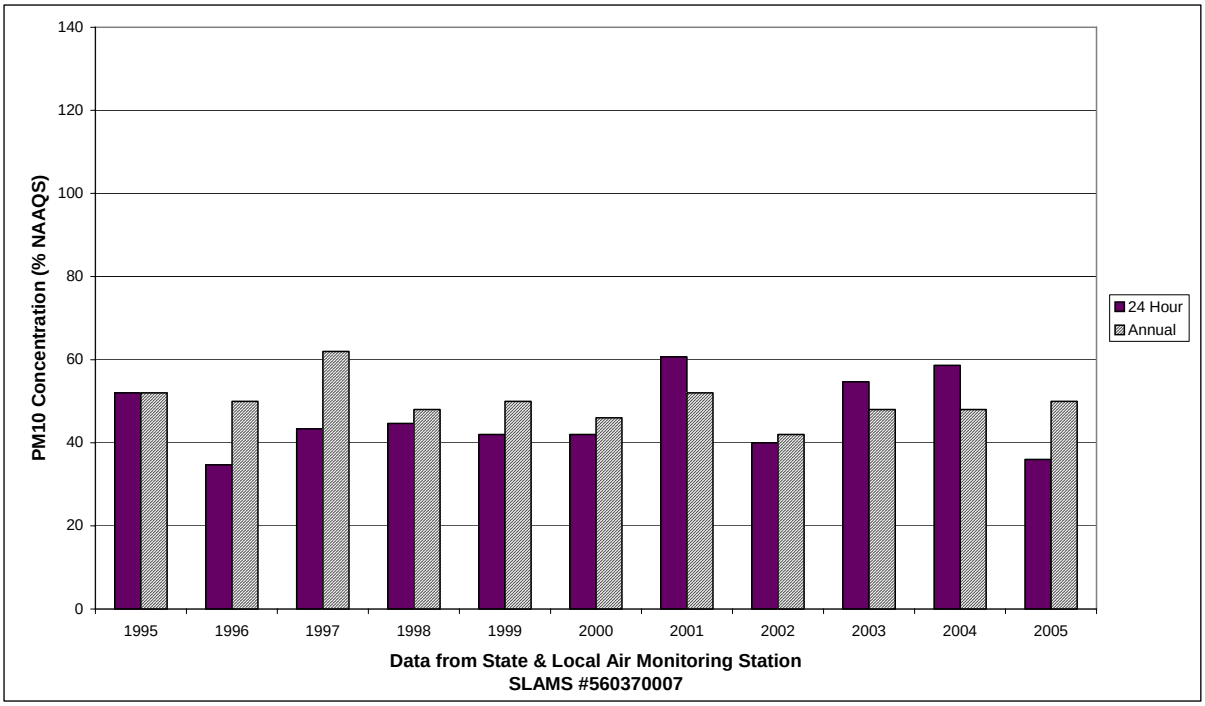
The BLM works cooperatively with several federal agencies to measure visibility with the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE station operating in the Class I area nearest to the planning area, approximately 40 miles to the east, is in the Bridger Wilderness Area. Figure 3-2 shows the visual range measured in the Bridger Wilderness Area since 1989.

Atmospheric Deposition

Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic ecosystems. Much of the concern about deposition is due to secondary formation of sulfur and nitrogen compounds, which may induce acidification of lakes, streams, and soils and impact other ecosystem characteristics, including nutrient cycling and biological diversity.

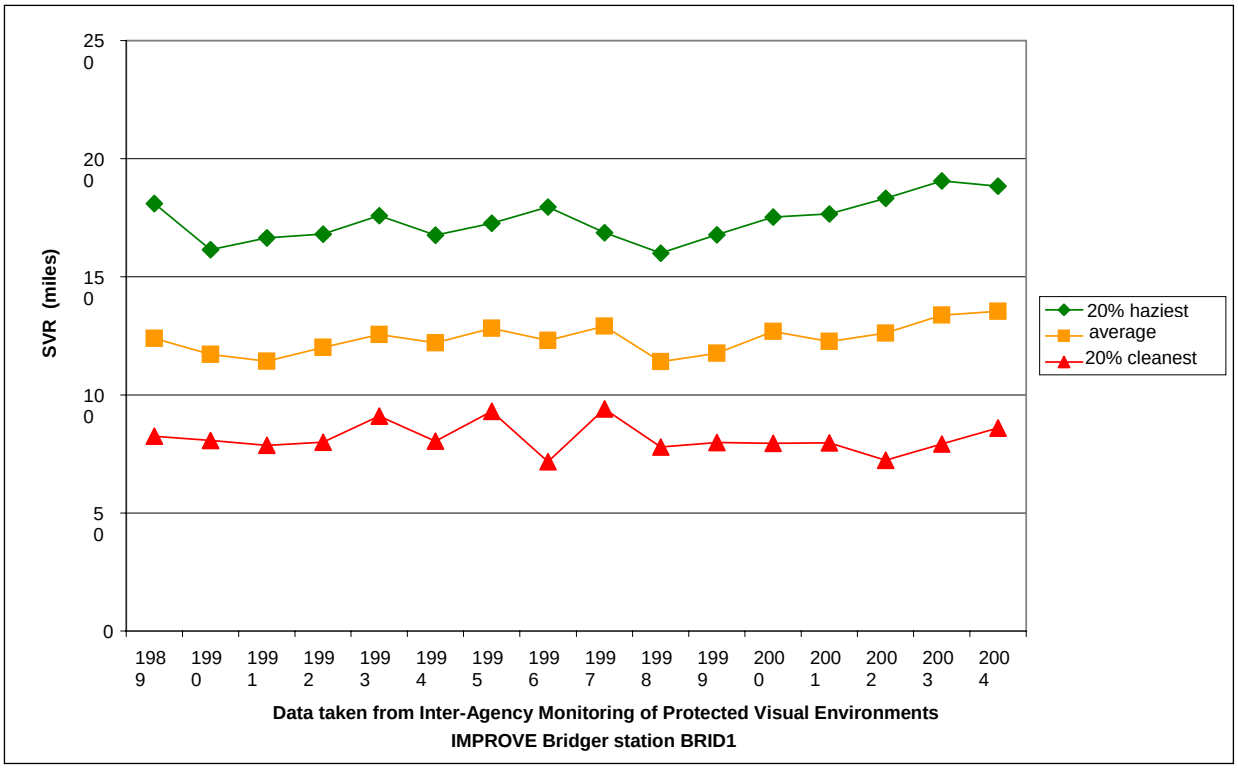
Secondary formation of pollutants occurs when primary pollutants (such as nitrogen oxides [NO_x] or SO_2) chemically react in the atmosphere to produce new compounds, such as nitrates or nitric acid, which can have more direct impacts on fragile ecosystems.

Figure 3-1. Particulate Matter Concentrations in Rock Springs, Wyoming



Source: EPA 2006
NAAQS National Ambient Air Quality Standards
PM_{10} particulate matter less than 10 microns in diameter

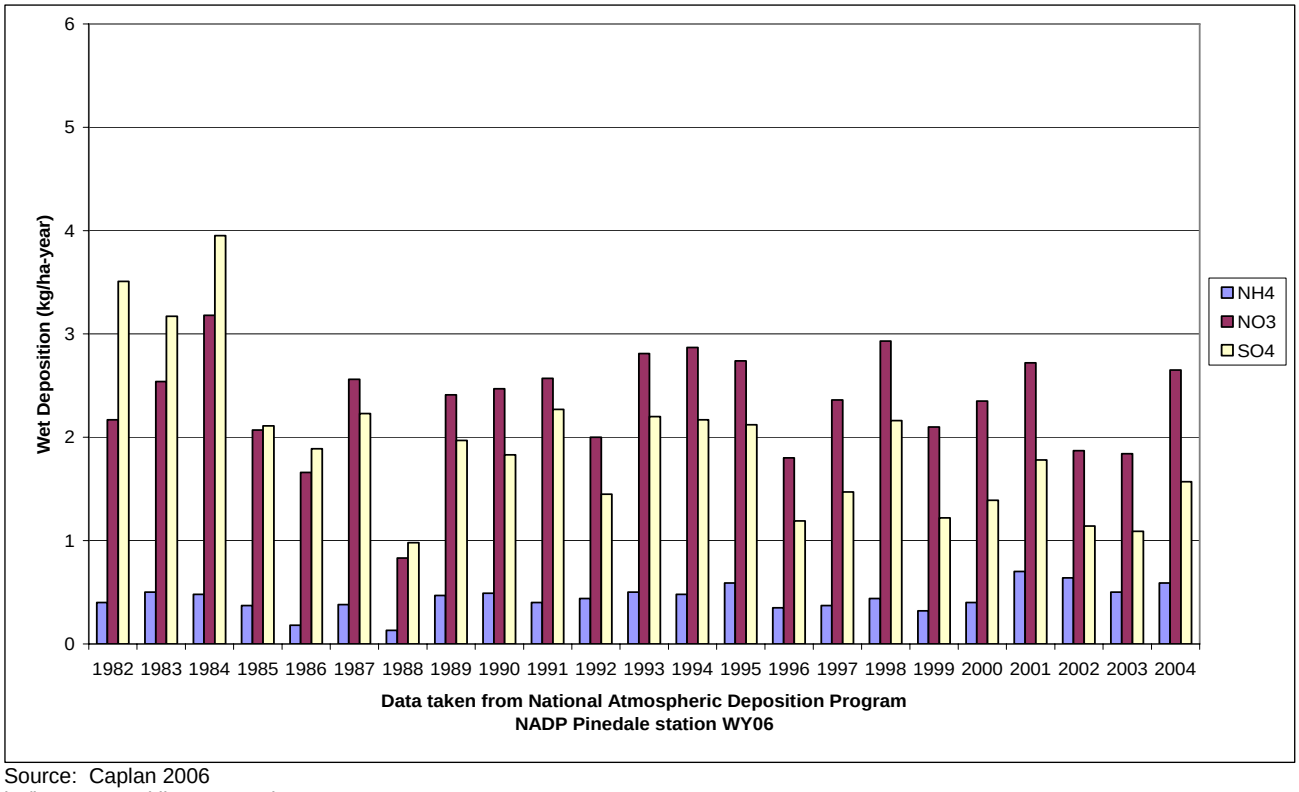
Figure 3-2. Annual Visibility (Standard Visual Range) in Bridger Wilderness



Source: Caplan 2007
SVR Standard Visual Range

Air pollutants are deposited by either wet (precipitation) or dry (gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation) deposition. The BLM works cooperatively with the U.S. Environmental Protection Agency (EPA) to measure dry deposition. Three Clean Air Status & Trends Network (CASTNet) stations operate in Wyoming. The CASTNet station nearest to the planning area is located in Pinedale, Wyoming. The BLM works cooperatively with private, state, and other federal organizations to measure precipitation chemistry and wet deposition. Eight National Atmospheric Deposition Program (NADP) stations operate in Wyoming. In addition, a NADP station at Murray Ridge, Utah, is located on the western edge of the Kemmerer Planning Area. This station monitors wet deposition directly applicable to the planning area. Figures 3-3 and 3-4 present the wet deposition data collected near Pinedale (close to the Bridger Wilderness Area) and at Murray Ridge, respectively. Figure 3-5 presents the dry deposition collected near Pinedale for a period of 15 years.

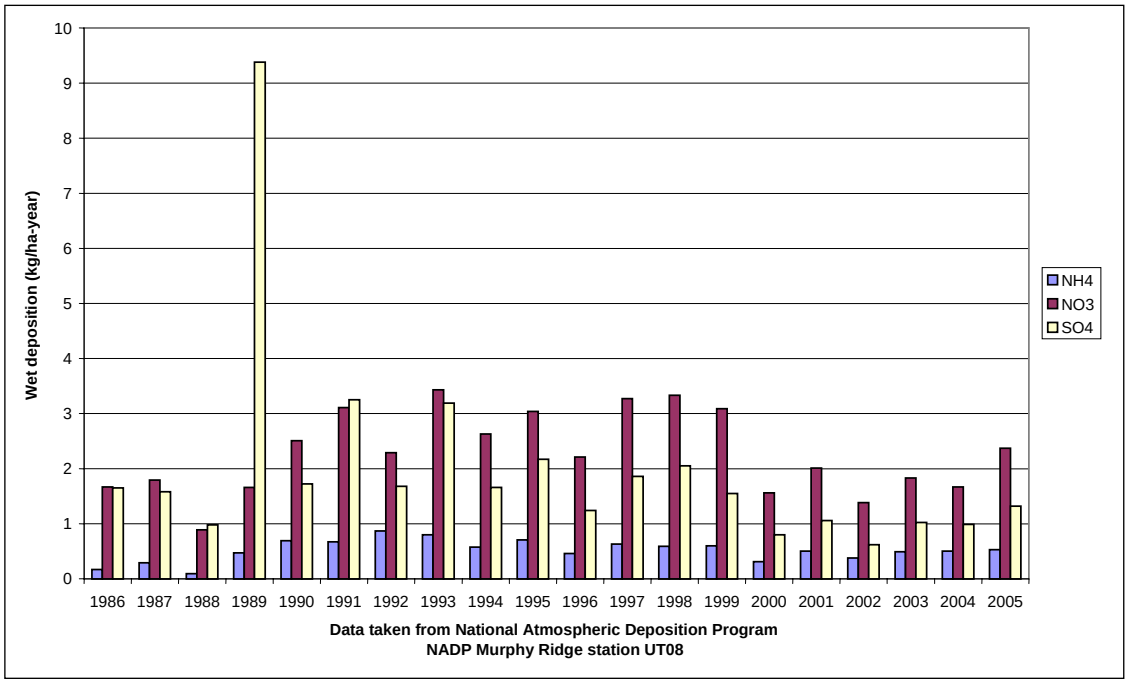
Figure 3-3. Mean Annual Wet Deposition near Pinedale, Wyoming



Source: Caplan 2006

kg/ha-year	kilogram per hectare per year
NH_4	ammonium
NO_3	nitrate
SO_4	sulfate

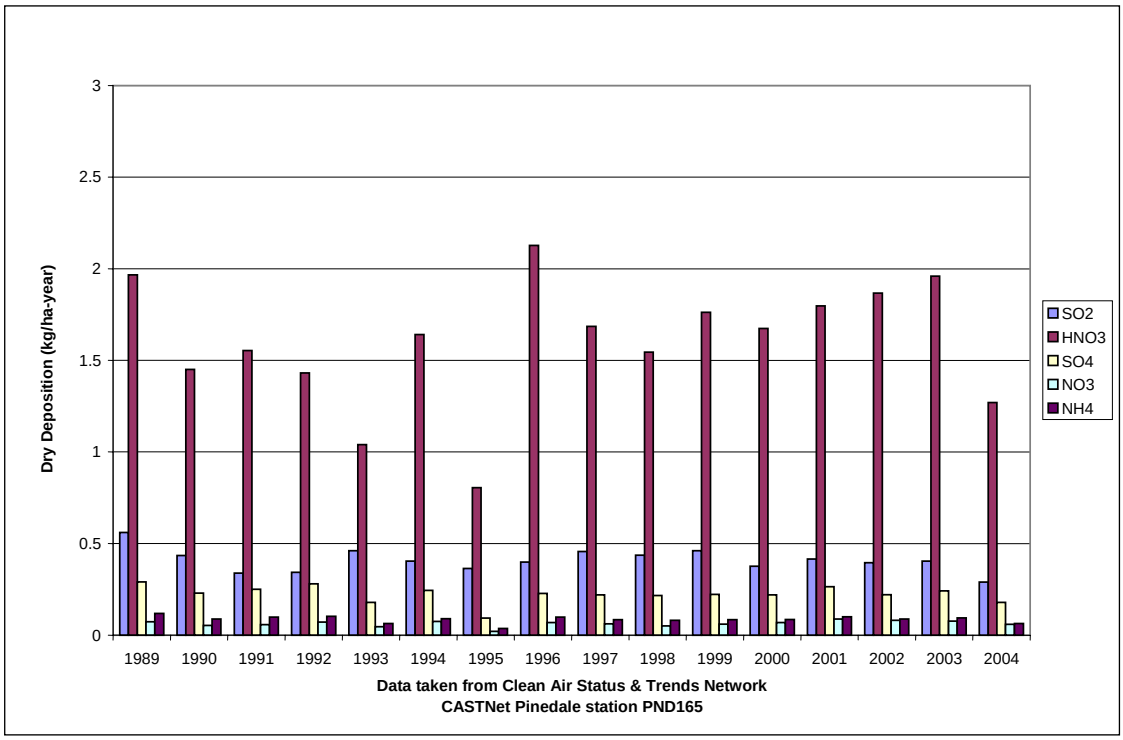
Figure 3-4. Mean Annual Wet Deposition on the Western Edge of the Kemmerer Planning Area



Source: Caplan 2007

kg/ha-year	kilogram per hectare per year	NH4	ammonium
NO_3	nitrate	SO_4	sulfate

Figure 3-5. Mean Annual Dry Deposition near Pinedale, Wyoming



Source: Caplan 2007

kg/ha-year	kilogram per hectare per year	SO_2	sulfur dioxide
$HN0_3$	nitric acid	SO_4	sulfate
NH_4	ammonium		

Hazardous Air Pollutants (HAPs)

HAPs include air pollutants that can produce serious illnesses or increased mortality, even in low concentrations. HAPs are compounds with no established federal ambient standards that may have thresholds established by some states and are typically evaluated for potential chronic inhalation and cancer risks. The impact of HAPs on sensitive members of the population is a special concern of the BLM. Sensitive receptor groups include children, the elderly, and the acutely and chronically ill who may be affected in homes, schools, playgrounds, and hospitals. Existing sources of HAPs within the planning area include (1) fossil fuel combustion that emits HAPs, such as formaldehyde; (2) oil and gas operations that emit volatile organic compounds (VOCs) and may emit hydrogen sulfide (H_2S); and (3) trona mining and processing.

Existing Emissions in the Planning Area

Table 3-3 presents an estimate of annual emissions that occurred within the planning area from resource types that produced substantial emissions during 2001. The planning area activities that impact air quality have not changed appreciably since 2001. Approximately the same number of oil and gas drilling rigs are operating in the planning area. These data show that the main contributors to emissions include natural gas development and production, salable minerals mining and processing, coal mining and processing, trona mining and processing, rights-of-way (ROW) corridors, and off-highway vehicle (OHV) use. Trona processing takes place on private land in a fairly small region of the Kemmerer planning area; however, the emission plumes are visible on BLM-administered lands, especially during winter air inversions. Year 2001 activities are used to define existing air quality conditions in the planning area for comparing the impacts of future emissions from each alternative.

Table 3-3. Year 2001 Annual Emissions for Activities on BLM-Administered Land and Federal Mineral Estate within the Kemmerer Planning Area

Resource	Emissions (Tons per Year)						
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO	VOC	HAPs
Natural Gas Development and Production	114	69	870	63	823	6,148	623
Salable Minerals Mining and Processing	290	34	20	0	3	1	0
Coal Mining and Processing	407	142	1,320	2	285	0	0
Trona Mining and Processing	1,934	1,934	4,855	5,043	4,490	7,205	473
ROW Corridors	73	54	893	21	328	85	8
OHVs	7	7	3	0	434	234	23
Oil Development and Production	6	1	7	1	2	0	0
Locatable Minerals Mining and Processing	1	1	17	0	6	2	0
Resource Roads	4	0	0	0	0	0	0
Livestock/Grazing	2	0	1	0	1	0	0
Vegetation Management	2	0	0	0	0	0	0
Year 2001 Totals	**2,840**	**2,242**	**7,986**	**5,130**	**6,372**	**13,675**	**1,127**

Sources: BLM 2003a, Potter 2006, Bott 2006

CO carbon monoxide
HAPS Hazardous air pollutants
NO_x nitrogen oxides
OHV off-highway vehicle
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compounds

Management challenges identified for air quality in the planning area are based, in part, on historic activities and current conditions and trends. The paragraph listed below discusses the three current primary management challenges.

First, the Wyoming Department of Environmental Quality-Air Quality Division (WDEQ-AQD) has the regulatory authority and responsibility, with EPA oversight, to enforce air quality standards. Federal land managers, such as the U.S. Department of Agriculture (USDA) Forest Service (USFS) and the National Park Service (NPS) have the authority and responsibility to set land management guidelines. BLM works cooperatively with these agencies to estimate potential impacts to air quality and to address air quality issues. Second, the development of mechanisms to better characterize the current status and future trends in air quality, such as establishing long-term air quality monitoring stations, may be difficult to accomplish within current budgets. Third, prescribed burning is a tool with potential benefits in managing the resource area, but could have air quality implications that need to be considered, including possible public health and visibility impacts.

Management actions anticipated to address the above challenges include characterizing the current status and future trends in ambient air quality in the planning area, estimating potential future ambient air quality in the planning area, determining the range of air quality issues in the planning area, and implementing actions to maintain compliance or improve air quality. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.1.2 Soil

The Kemmerer Field Office is responsible for managing soils on BLM surface and those soils that may be affected by BLM decisions on split-estate. In general, soil management focuses on maintaining soil integrity, reclaiming disturbed soils, reducing erosion, and, in some cases, improving soil health.

Soils in the planning area are diverse and can vary in characteristics over relatively short distances. The distribution and occurrence of soils depend on many factors, including slope, geology, vegetation, climate, and time. Soils managed by the Kemmerer Field Office formed from a variety of parent materials, reflecting the influence of surficial geology and geomorphology.

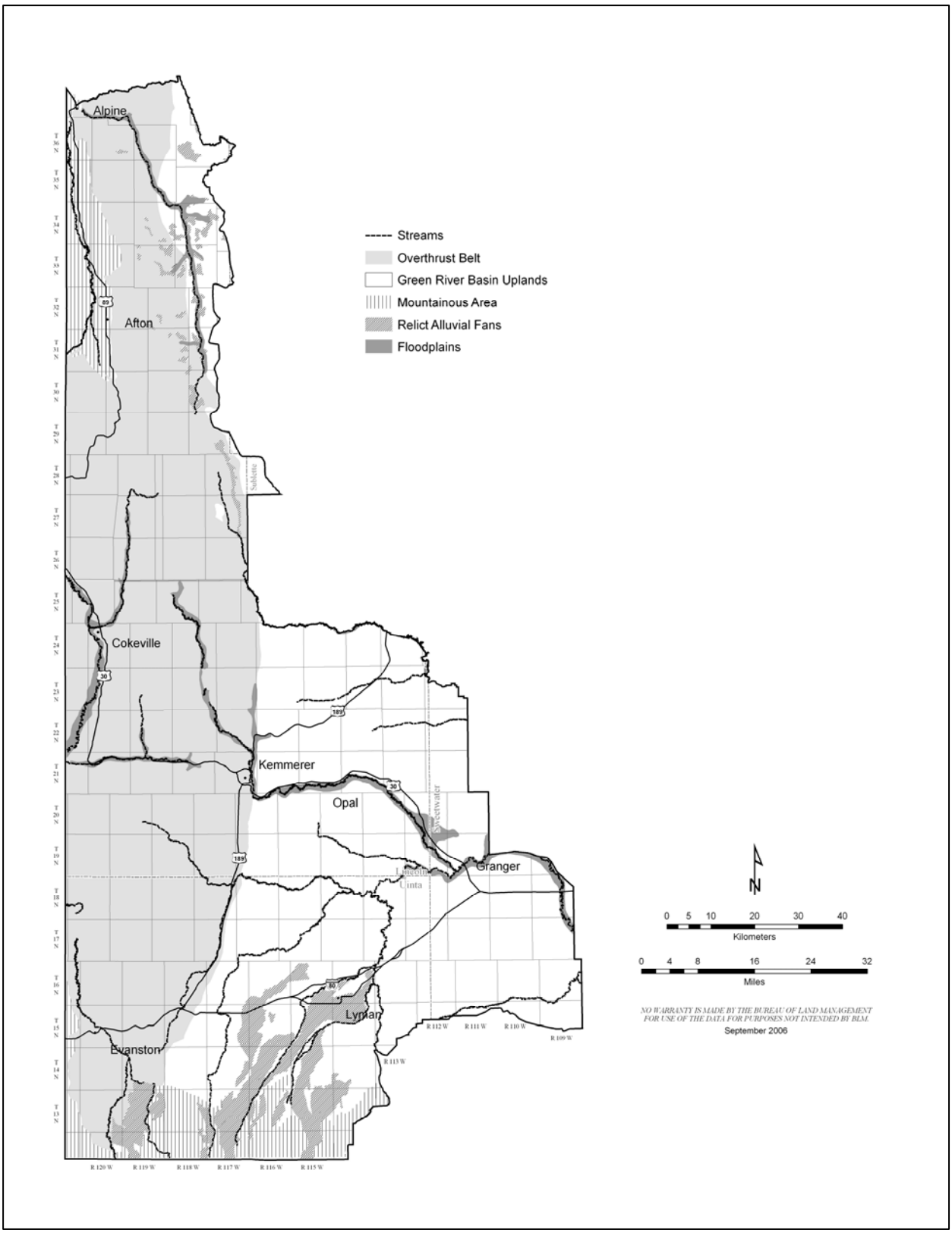
The Kemmerer Field Office lacks a detailed soils inventory for the planning area; however, soils can be subdivided into five groups based on their geomorphic characteristics. Within the planning area, soils with a high amount of silt-sized carbonates or a reddish color tend to be particularly susceptible to water erosion due to poor cohesion qualities that tend to lose aggregate structure when wet. The five soil groups, shown in Map C, are summarized below.

Soil Group 1: Overthrust Belt

Steep, sloping major ridges with narrow valleys trending north-south are found in association with the Overthrust Belt that extends south of Evanston at the Utah State line to the western divide of the Muddy Creek drainages. This area narrows to the north and tapers in the Cokeville area. Dominant parent materials include residuum formed over sediments; colluvium, including landslide and earth-flow deposits; and alluvium on footslopes and drainages. Geologic overthrusting and the resulting mixed exposures have produced variable soil textures and complex soil/geomorphic relationships. In the narrow valleys and drainages, very deep and well-drained reddish and brown soils are common. The upland ridges are characterized by soils of varying depths, both red and brown in color.

Most red soils along the upland ridges, such as along the Bear River Divide, are highly susceptible to water erosion when disturbed. Areas within the Overthrust Belt, especially low areas, are saline (high in soluble salts and sodium), which is a water quality concern in the Colorado River basin.

Map C. General Soil Groups in the Planning Area



Source: BLM 2003a, BLM 2006a

Soil Group 2: Green River Basin Uplands

This group is the largest in the planning area and contains the sedimentary uplands of the Green River basin. It is bounded by Oyster Ridge on the west, extends beyond the Kemmerer Field Office to the east, becomes a narrow band along Fontenelle Creek in the north of the planning area, and is bounded in the south by the foothill terraces of the Uinta mountains. Its broken landscape is dominated by low relief bedrock-controlled ridges, erosional sideslopes, and alluvial fans. Included within this group are badlands, such as those found along Cottonwood Creek and the Moxa Arch field, and scattered clusters of sand dunes south of Shute Creek and in the Blacks Fork and Muddy Creek uplands.

Many soils in this group are formed in shales producing clayey textures with poor surface water infiltration, high runoff potential, and high carbonate levels that create a high potential for water erosion. Also common in this group, are soils with surface textures that are highly susceptible to water erosion due to a high proportion of fine sands or silts with little binding material or silt-sized carbonates. Many soils in this group are susceptible to excessive wind erosion due to sandy surface textures, low organic matter, and high carbonate content. This soil group has a high proportion of saline soils, especially in low topographic areas, such as drainages and areas below marine shale outcrops.

Soil Group 3: Mountainous Areas

This group occurs in the northern and extreme southern parts of the planning area including Star Valley as an extension of the Wasatch and Uinta mountains in Utah. Parent materials include sedimentary rock and glacial till, resulting in soils of various textures with various rock sizes within the soil profile. Mass wasting in the form of landslides and slumping occurs on the steeper, moister slopes. Coniferous and aspen trees are often present on these moist, north-facing slopes.

Soil Group 4: Relict Alluvial Fans and High Outwash Terraces

This group, located in the extreme south-central and northwestern parts of the planning area, is found on old alluvial terraces, fans, and pediments. These landforms were created as a result of alluvial material flushing out of the canyons of nearby mountains. Glacial till (Bishop Conglomerate) occurs in the southern part of Uinta County and generally is found on high, relatively level outwash terraces, such as Leavitt Bench. Soils in this position generally are deep, with rock and cobbles throughout the profile, which may affect some land uses.

Soil Group 5: Floodplains

This group, located along major drainages, comprises a relatively small percentage of the planning area and includes riparian areas and areas of high soil productivity. Due to the influence of adjacent soils and geology, these soils are not uniform in character and can be subdivided into three groups:

- Subgroup A: These soils generally are found in the eastern part of the planning area in intermittent drainages of the Green River basin, such as Slate Creek, Muddy Creek, and the lower part of Blacks Fork River. Textures are dominated by silty clays and other clays, and are often saline.
- Subgroup B: These soils are found along the perennial upper reaches of Blacks Fork River, Willow Creek, Bear River, and Hams Fork River in the Opal area. They tend to have more rock, vary more in texture, and are less saline.
- Subgroup C: These soils are associated with the mountains and foothills of the Overthrust Belt along the perennial drainages of Smiths Fork, Upper Hams Fork, La Barge Creek, upper Fontenelle Creek, Salt River, and Greys River. They have a variable texture and are not highly saline.

The condition of soil resources affect land use management decisions due to the importance of soil in public land health and the need for productive, stable soils for resource uses and programs. Data collection, such as soil surveying, resource monitoring in compliance with the statewide BLM requirements for public land health, and identifying hazards and limits for specific uses generally are completed in support of other BLM activities related to the management of resources and programs, such as rangeland, forestry, recreation, and mineral extraction.

When undisturbed, soils in the area generally are in good condition and capable of producing forage and maintaining watershed integrity and surface water quality. Removing the stabilizing vegetation cover through surface disturbance often starts the detachment of soil particles, which then become airborne or are transported by surface water runoff, eventually to be deposited elsewhere on the landscape. Examples of the effects of vegetation removal and surface disturbance documented in this area include the following:

- Accumulation of sand against sagebrush downwind from a burn area
- Vegetation pedestals that stand inches above the adjacent unprotected, wind-scoured or water-eroded soil surface
- Sedimentation deposited into streams from nonpoint sources by stormwater runoff.

Soils are affected by a variety of surface uses that loosen topsoil and damage or remove vegetation or other ground cover. Surface disturbance may occur from activities such as grazing, forest management, OHV use, and the use of prescribed fire. Surface-disturbing activities include any authorized actions that disturb vegetation and (or) surface soil, thereby increasing erosion potential above normal site conditions. Surface-disturbing activities include construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, vegetation treatments, or concentrated OHV cross-country travels. Accelerated erosion, soil erosion at rates higher than natural erosion rates, and exceeding the rate at which soil-forming processes can create soil in place, may result from soil compaction or surface disruption, often associated with surface disturbance.

Soil biological crusts are a mosaic of bacteria, algae, lichens, mosses, and microfungi that weave through the top few centimeters of soil, gluing loose particles together and forming a matrix that stabilizes and protects soil surfaces from erosive forces. On rangelands, soil crusts function as living mulch by retaining moisture, discouraging annual weed growth, reducing water and wind erosion, fixing atmospheric nitrogen, and contributing to soil organic matter. These crusts, when undisturbed, tend to occupy the nutrient-poor zones between vegetation clumps (BLM 2001c). Crusts are well-adapted to severe growing conditions, but poorly adapted to compressional disturbances from vehicles, people, or animals. Once soil crusts are damaged or destroyed, they recover very slowly, especially in arid climates. Recovery can be enhanced by limiting the size of disturbance so that contiguous crusts can act as a source to recolonize the disturbed area (BLM 2001c).

Physical soil crusts are different from biological crusts and generally form in coarse sandy soils with low organic matter content, high salinity, and high alkalinity. Physical crusts may form when exposed to raindrop splash on bare soil or as a result of compaction. Soils with physical crusting typically reduce water infiltration and can prevent seedling emergence (BLM 2001c).

Management challenges identified for soils in the planning area are based, in part, on historic activities, conditions, and trends. Managing soils within the planning area emphasizes maintaining soil and landscape integrity through efforts to minimize accelerated erosion, avoiding or minimizing destruction of biological soil crusts, establishing successful site reclamation, and, in some cases, improving soil health through implementing grazing management plans. Reclamation of surface-disturbing activities and improving grazing management have been successful in sustaining soil productivity in most cases. Accelerated erosion within the planning area is mainly the result of soil compaction by livestock and

vehicles, runoff from roads, and uncontrolled concentrated flow from poorly reclaimed or unreclaimed bare ground created by surface-disturbing activities.

Public scoping comments on soil focused on the level of mitigation and timing of reclamation following surface-disturbing activities, consideration of total surface disturbance in an area when evaluating the effectiveness of management actions, and the management of road networks and maintenance of roads and trails to minimize soil erosion and other impacts.

Protection of soil resources currently is accomplished through the application of use restrictions or management practices intended to limit soil erosion or loss of soil productivity. Some restrictions are general, such as programmatic constraints applied to all surface-disturbing activities, including restricted access during periods of wet or frozen soils or limitations on operations on steep slopes. Specific restrictions include limiting OHV access to designated areas where no highly erodible soils occur. Typically, protection of soil resources is accomplished through the application of site-specific management practices, including installing water bars or diversion channels to control surface runoff around bare soil or off a road and developing specific seed mixtures or seeding techniques appropriate to the reclamation area.

Salt and sediment yield are concerns in the Colorado River basin, of which the Green River basin is part. Salt and sediment yield are also concerns in the Bear River basin and Bear Lake. The Bear Lake Regional Committee was formed to address these concerns. Although they can inhibit vegetation growth, salts held deeper in the soil profile generally are not a substantial source of salinity to the Colorado River basin, except along drainages where bank erosion or subsurface leaching occurs. Salts in soils are a land use management challenge primarily when surface disturbance and reclamation of disturbed land occurs. Another challenge is the demand placed on soils in the planning area due to the development of mineral resources. A concern for potential salt-loading to the Colorado River from increasing development of coalbed natural gas (CBNG) in the Green River basin was expressed in the *2002 Review of Water Quality Standards for Salinity* by the interagency Colorado River Basin Salinity Control Forum (2002).

To address management challenges, management objectives for soils generally address the following: identifying and interpreting existing soil resources and condition; utilizing soil use limitation ratings for land use actions; preventing accelerated soil erosion from disturbed areas; utilizing effective BMPs; establishing successful reclamation on disturbed areas; managing activities to maintain or improve long-term soil productivity; and monitoring, evaluating, and adapting management actions, as needed. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Currently implemented management actions that apply to all alternatives include the following:

- Pursue and support ongoing soil surveys throughout the planning area.
- Mitigate projects within areas of fragile soils, steep slopes, biological crusts, and soils with low reclamation potential by requiring proponents to complete and adhere to an Erosion, Revegetation, and Restoration Plan.
- Evaluate, in areas identified as having poor topsoil (i.e., badlands, saline bottomlands, calcareous) the need for topsoil salvage and mitigate by removing vegetation and soil only over the necessary construction area, when feasible.
- Emphasize the reduction of soil erosion, sediment, and salinity contributions to the Green River, with emphasis on protecting areas with highly saline and sensitive soils.
- Restrict surface disturbance on slopes greater than 25 percent by requiring soil erosion control that ensures adequate revegetation (see Map 4).

- Restrict surface disturbance when soils are saturated, frozen, or when watershed damage is likely to occur.
- Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion to provide for optimal plant growth.
- Require engineering on roads to be constructed on BLM-administered lands where soil damage may occur.
- Require reclamation of surface disturbances, including ripping (to relieve soil compaction) and recontouring, upon completion of operations. Require interim reclamation on well locations and similar disturbed soils to improve stability and infiltration. Perform compliance checks on all reclamation projects to ensure soil stabilization.
- Take appropriate measures (e.g., stabilize, reseed top soil stockpiles, and retain order of soil horizons) to protect soil microbial components.
- Limit development on slopes more than 40 percent.

3.1.3 Water

Water resources include both surface and subsurface resources. The availability, volume, and quality of water resources affect other resources and resource uses, including, but not limited to, wetlands and riparian areas, biological resources, livestock grazing, recreation, and public water supplies.

The BLM is responsible for managing surface lands and federal mineral estate in a manner that maintains or enhances water quality and quantity for other uses and complies with state and federal water quality standards. The BLM coordinates with state and other federal agencies to ensure compliance with required water resource management responsibilities. The Wyoming DEQ is responsible for water quality. The EPA and U.S. Army Corps of Engineers (USACE) are jointly responsible for administering Section 404 of the Clean Water Act (CWA) regarding wetlands and waters of the United States, and the Wyoming State Engineer's Office is responsible for administering water rights in the planning area. The Wyoming DEQ, in compliance with the federal CWA, maintains a policy of "antidegradation" of surface waters that requires that water quality be maintained or improved, especially for outstanding (Class 1, see Glossary) and high quality (Class 2) waters (Wyoming DEQ 2002).

Surface water encompasses portions of three (3rd-order) regional watersheds—Green River, Bear River, and Snake River. A relatively small portion (7-square miles) of the extreme southwest corner of the planning area is within the Upper Weber watershed (Hydrologic Unit Code [HUC] 160201) which drains to the Great Salt Lake. However, the Upper Weber watershed contains no BLM-administered lands and, therefore, is not discussed further. Perennial and intermittent streams, lakes, and reservoirs support fish through at least a portion of the year. They are listed below in association with the regional watersheds in which they occur. Map 7 in Volume 2 displays the boundaries of the regional watersheds and the major streams and water bodies within the planning area.

The Green River (HUC 140401), a tributary to the Colorado River, drains 3,680 square miles into the eastern portion of the planning area. As part of the Colorado River System, land use management within the Green River watershed is subject to the Colorado River Salinity Control Act. Prominent streams in this watershed include Horse Creek, Cottonwood Creek, Beaver Creek, Birch Creek, La Barge Creek, Delaney Canyon, Fontenelle Creek, Slate Creek, Eighteenmile Canyon, Shute Creek, Upper Henrys Fork, Upper Blacks Fork, Smiths Fork, Cottonwood Creek, Middle Blacks Fork, Dry Muddy Creek, Upper Hams Fork, Lower Hams Fork, Lower Blacks Fork, Sevenmile Gulch, Big Dry Creek, Muddy Creek, Little Muddy Creek, and Albert Creek. Fontenelle Reservoir, a large surface water resource, also occurs in the Green River basin on the northern edge of the planning area.

The Bear River (HUC 160101) flows north from the Uinta Mountains then winds in and out of the Wyoming-Utah border, eventually flowing into Idaho, north of Cokeville. The Bear River drains 1,490-square miles into the southwestern portion of the planning area north to Bear Lake and eventually to the Great Salt Lake. Tributaries include Twin Creek and Smiths Fork. Although not directly affected by the Colorado River Salinity Control Act, any actions taken to minimize salt production, erosion, and sedimentation provide sufficient benefits to land health to justify similar land use management decisions to those taken within the Colorado River drainage. Prominent streams in the Bear River watershed that could be directly affected by BLM management include, but are not limited to, Stillwater Fork, Sulphur Creek, Pleasant Valley Creek, Yellow Creek, Saleratus Creek, Bear River-Big Creek, Bridger Creek, Twin Creek and its tributaries, Bear River, Smiths Fork, and Thomas Fork, Raymond Creek, Huff Creek, Muddy Creek, Salt River, and Mill Creek. The larger streams in the area, including the Smiths Fork and the main channel of the Bear River would experience more indirect than direct impacts as the result of BLM actions.

The Snake River (HUC 170401) drains 957 square miles into the northern portion of the planning area. Although not directly affected by the Colorado River Salinity Control Act, any actions taken to minimize salt production, erosion, and sedimentation provide sufficient benefits to land health to justify similar land use management decisions to those taken within the Colorado River drainage. Prominent streams in the Snake River watershed include Fall Creek, Hoback River, Greys River, Indian Creek, and Salt River.

Proper functioning condition is the minimal desired state of physical stability and resiliency desired on all water bodies and riparian areas. According to the BLM guidance document, *Riparian Area Management, Process for Assessing Proper Functioning Condition* (Prichard 1998), the functioning condition of riparian areas and wetlands is a result of the interaction of geology, soil, water, and vegetation. Healthy riparian-wetland areas are integral to healthy watersheds. Not only is riparian-wetland condition an important component of watershed condition, it is also an indicator of overall watershed health (see Section 3.4.3 Vegetation – Riparian and Wetland Communities).

The BLM uses a process to determine whether riparian areas and wetlands along perennial streams are in proper functioning condition. The process of analysis is referred to as Proper Functioning Condition survey. The process is intended as a guide to develop management strategies. The Standards for Rangeland Health (43 Code of Federal Regulations [CFR] 4180) specify that the BLM shall ensure that:

Watersheds are in, or making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components.

The categories of proper functioning condition include the following:

- **Proper Functioning Condition**: Riparian areas and wetlands are in Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate energies associated with high water flows, wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion, filtering sediment, and improving water quality. Riparian areas and wetland in proper functioning condition aid floodplain development; improve flood-water retention and groundwater recharge; develop root masses that stabilize stream banks islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics *to provide* the habitat the water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity.
- **Functional At-Risk**: Riparian areas and wetlands in functional condition, but existing soil, water, or vegetation conditions make them susceptible to degradation:
  - Downward trend: areas trending downward or degrading
  - No apparent trend: areas without an apparent trend

- Upward trend: areas trending upward or improving.

- **Nonfunctional**: Riparian areas and wetlands that do not contain adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and are not reducing erosion or improving water quality.

A determination of categories of functioning condition for streams in the planning area is summarized in Table 3-4. The information is shown as a percentage of the stream miles in each of the three regional watersheds with BLM land in the planning area. The monitoring of these areas is an ongoing process; therefore, the classification in Table 3-4 may not fully represent current conditions.

Table 3-4. Functioning Condition Ratings of Streams on Public Land in the Planning Area

Basin	Proper Functioning Condition	Downward Trend Functional At-Risk	No Apparent Trend Functional At-Risk	Upward Trend Functional At-Risk	Nonfunctional	Not Rated
Green River	30%	3%	43%	19%	6%	0%
Bear River	31%	13%	36%	12%	6%	1%
Snake River	89%	11%	0%	0%	0%	0%

Source: BLM 2006a
Note: Detail may not add up to 100 percent due to rounding.

Groundwater

Groundwater resources occur in the two major geologic features—the Overthrust Belt and the Green River Structural basin. These structural basins were formed by the deformation of some of the rock formations and are not the same as watersheds. The Green River Structural basin encompasses a portion of the western side of Wyoming, with the Rock Springs Uplift forming the eastern boundary. Groundwater quality varies throughout the planning area, influenced by the regional geologic structures. Groundwater in the Green River Structural basin is primarily recharged from direct infiltration of surface water and from the recharge area in the mountains to the east. Groundwater quality is highly variable but tends to deteriorate with depth and distance from recharge areas, primarily due to increasing salinity (USGS 2005).

The folded geology of the Overthrust Belt complicates groundwater sources and recharge, and directs groundwater flow to the west. The contact between the Overthrust Belt and the Green River Structural basin acts as a groundwater barrier between the two structural basins. Within the Overthrust Belt, groundwater sources are localized and variable.

Surface Water and Groundwater Quantity and Use

The condition of surface and subsurface water resources affects natural resources, as well as resource uses, economics, and public health. The Watershed and Water Resources Program primarily plays a support role in the Kemmerer Field Office. Data collection, resource monitoring, and analysis generally are done in support of other activities, such as range management, forest management, and mineral extraction.

Surface water quality and quantity are variable within the planning area, but typically are adequate to meet existing uses on public lands. Natural climatic fluctuations, such as drought, can make marginally adequate sources unreliable.

Within the Green River watershed in the planning area, Reardon Draw, Willow Creek, and portions of Smiths Fork and Hams Fork watercourses are identified as impaired for aquatic habitat from unknown

sources (Wyoming DEQ 2004). In the Bear River watershed, reaches of Bridger Creek and Bear River are identified by Wyoming DEQ as impaired. Since the 1980s, Bridger Creek water quality and quantity has improved due to the construction of detention basins and improved livestock grazing practices, but is still listed as having degraded aquatic habitats. Sediment that damages aquatic life is the cause of the impaired designation in a reach of the Bear River in the planning area (Wyoming DEQ 2004). Portions of the Salt River in Star Valley are listed as impaired mainly due to fecal coliform levels that affects contact recreation (Wyoming DEQ 2004). The 2006 303d list and 305b report are available on the Internet with an updated list of impaired waters in the state (http://deq.state.wy.us/wqd/watershed/Downloads/305b/2006/2006_305b_pdf).

Areas with high to medium-high vulnerability to affect groundwater quality are found in the alluvial floodplains of the major rivers, including the Salt, Bear, and Green rivers, as well as the floodplains of Smiths Fork, Blacks Fork, Henrys Fork, Bitter Creek, and Sandy Creek. In general, groundwater is vulnerable in these areas due to high water tables, sandy soils, and high hydraulic conductivity rates, resulting in the rapid transport of contaminants through the soil and rock without much buffering or filtration (Wyoming Geographic Information Science Center 2003). Downstream basins, such as Bear Lake and Flaming Gorge Reservoir, also are vulnerable to receiving high amounts of substances, such as phosphate, which can run off from mining and agricultural areas as a byproduct of fertilizers and animal wastes. High levels of phosphate in water bodies can cause eutrophication, which can lead to increased algal growth and reduced levels of dissolved oxygen available for other species in water systems.

The management and use of resources that require surface disturbance, such as minerals, range, forestry, and recreation can affect surface water quality, mainly by increasing sediment loads, salt, and turbidity. Stream bank degradation and erosion, as well as upland sheet, rill, and gully erosion, due to poor vegetative cover and surface disturbance within the watersheds, are the predominant sources of sediment and dissolved solids found in the streams. Surface disturbance results from such activities as the construction of roads, well pads, and pipelines, as well as livestock grazing, OHV cross-country travel, and fire-suppression activities. Proper management of livestock grazing, road construction, forestry, oil and gas exploration and development, mining, and recreation, along with the proper application of mitigation measures identified in site-specific management or development plans, can help to mitigate the impacts of these activities.

Wyoming Pollutant Discharge Elimination System (WYPDES) permits required by the State of Wyoming regulate water quality changes. The WYPDES Storm Water Program requires the implementation, inspection, and maintenance of BMPs according to Storm Water Pollution Prevention Plans and erosion and sediment control plans (BLM 2004g).

Water rights for surface water are allocated as established by the Wyoming Constitution under the doctrine of prior appropriation, or “first in time, first in right.” However, water rights are considered property rights associated with the land and can be transferred in use or location only after a review by the Wyoming State Engineer’s Office or Board of Control. Within the planning area, most water rights are used for agriculture on private and state property. On BLM-administered lands in the planning area, the primary uses of water rights are livestock production, biological resources maintenance, and oil and gas exploration and development activities.

Public scoping comments on water resources focused on managing or prohibiting CBNG disposal into water bodies, protecting springs and seeps, complying with water quality standards and regulations, and encouraging water developments for livestock and wildlife.

Surface-disturbing actions within the planning area are designed to protect and enhance water resources and include avoiding highly erodible soils, implementing zero runoff programs on large-scale disturbances, and reclamation of surface disturbance. Potable groundwater supplies are protected, and oil and gas wells are cased and cemented below freshwater zones to prevent the contamination of aquifers.

Other actions to enhance and protect water resources during oil and gas development include plugging exploration holes and reducing sedimentation during road building and other surface-disturbing activities.

The BLM has various water resource plans and stipulations to guide management of water resources in the planning area. Watershed plans are commonly used to address degradation of specific streams and riparian resources. Water resource protection plans and stipulations are used to prohibit development within a certain distance from surface water resources, such as streams, lakes, reservoirs, and groundwater resources (e.g., wells and springs). Other water management plans minimize damage to especially fragile areas in specific locations and water resources with special designations.

3.2 Mineral Resources

Mineral resources include the individual resources of locatable, leasable-oil and gas, coal, sodium (trona), other solid leasables, and salable minerals. Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions. More information regarding the various mineral commodities is available in the Mineral Assessment Report (BLM 2004a), and can be accessed on the Kemmerer RMP revision website (www.blm.gov/rmp/kemmerer).

3.2.1 Locatable

Locatable minerals that occur in various geologic formations in the planning area include metals (e.g., gold, silver, titanium, copper, chromium, and uranium), as well as commodities such as fire clay and bentonite. Precious gems known to occur or having the potential to occur within the planning area include diamond, pyrope garnet, and chromium diopside. Common varieties of sand, gravel, specialty stone, including moss rock, most clays, and limestone and sandstone, are considered salable minerals and are addressed in the Salable Minerals section. Although mining claims recently have been staked for building and specialty stone, none of the deposits have been determined to be locatable under the *Mining Law of 1872* at this time. Unlike leasable minerals (e.g., oil, gas, or coal) or salable minerals (e.g., sand and gravel), where issuance of a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is at the discretion of the claimant.

The only current mining activities involving locatable minerals are for fire clay in Uinta County, north of Evanston, Wyoming. Fire clay (also known as refractory clay) is one of six types of clay mined in the United States. Fire clay is able to withstand temperatures of 1,500 degrees Celsius (°C) without deforming or melting (Harris and King 1986).

Fire clay occurs in scattered areas within the Overthrust Belt portion of the planning area. Specifically, it is known to occur in outcrops within the Evanston Formation (north of the town of Evanston in Uinta County) and in outcrops within the Frontier Formation. Occurrences are also within the Adaville Formation in Lincoln County near Elkol, Wyoming (south of Kemmerer) (Harris and King 1986). A large proportion of the total clay production in Wyoming, other than bentonite, occurs in Uinta County.

Currently, there are two companies producing fire clay in the planning area. Interpace Industries, Inc. produces refractory clay on private land from one of the Evanston Formation locations (Harris and King 1986). Interstate Brick Company produces clay from the Evanston Formation in a pit northeast of the Interpace Industries pit. In 1985, Interstate Brick Company filed for a clay patent maintaining that its clay deposit was locatable under the *Mining Law of 1872*. The patent examination concluded that some portions of the application area did in fact contain a marketable and valuable clay deposit, thus making it a locatable deposit.

Bentonite is sodium montmorillonite clay used as a binder in foundry molds, pet litter, drilling mud, and iron ore pelletizing, and is considered a locatable commodity (WSGS 2005a). It is increasingly used to form impermeable liners for waste disposal ponds. During the Cretaceous period, ash from volcanic eruptions dropped into the seas that covered much of Wyoming. These sediments were altered over geologic time to form bentonite. In the Overthrust portion of the planning area, bentonite occurs in various Cretaceous and Tertiary-age formations. The deposits are generally linear, and consist of beds up to 5 feet in thickness. The deposits are also deformed, and of limited aerial extent (Geo/Resource Consultants, Inc., 1984). Bentonite typically has the characteristic of swelling to many times its original size (Geo/Resource Consultants, Inc. 1984) and was first mined on a small scale in Wyoming during the 1880s. More substantial deposits were discovered during the 1920s (Black Hills Bentonite, LLC 2002). Although bentonite is known to occur in the planning area, there has been no commercial production. Dipping beds, coal withdrawals preventing location of mining claims for bentonite in some parts of the

planning area, and other factors, such as the abundance of economically mineable bentonite elsewhere in Wyoming, have resulted in a low probability of development of bentonite during the life of the plan.

The planning area has seen little development of gemstones, and minimal production is expected in the future. Mining claims and associated exploration for diamonds occurred recently in the southeast portions of the planning area; however, no major discoveries are known to have occurred.

Although there are small deposits of various metals in the planning area, none is economically significant and very little activity is anticipated during the life of the RMP.

Management challenges identified for locatable minerals in the planning area generally are related to conflicts with other resources. The locatable minerals program involves authorizing and permitting of mineral exploration, mining, and reclamation actions on BLM-administered public lands. Operations of greater than negligible disturbance of the surface of the mining claim or site require authorization. The necessary authorizations and permits are obtained through the Kemmerer Field Office in coordination with the State of Wyoming DEQ, Land Quality Division. Regulations provide for three levels of disturbance, the last two of which require authorizations: (1) casual use, (2) notice level, and (3) plans of operations. The program also oversees proper surface use and occupancy of mining claims.

Management actions for locatable minerals generally address those areas open or withdrawn from locatable mineral entry. Restrictions on locatable mineral surface disturbance result from management actions identified in other resource programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.2 Leasable – Oil and Gas

Oil and gas reserves in the planning area have been the focus of industry attention since commercial discoveries began around the year 1900 (BLM 2003a). Oil and gas production in the Green River basin, as a whole, began with the 1916 discovery of Lost Soldier Field (Law 1995). Oil and gas exploration of the Overthrust Belt dates back to the 1890s, and this area has been the focus of intense exploration, including seismic and drilling programs, since the mid 1970s (BLM 2003a).

In simplest terms, oil and gas is most often found in the pore spaces of sedimentary rocks such as sandstone and limestone, having migrated there from source rocks, such as marine shales, rich in organic material. When rocks containing this organic material are subjected to heat and pressure, the organic compounds break down over time, resulting in oil and natural gas. As the oil and gas is generated, it migrates through the pore spaces of the rock or along fractures until it encounters a structural or stratigraphic trap with pore spaces or fractures.

In the Kemmerer planning area portion of the Green River basin, concentrations of hydrocarbons are associated with the Moxa Arch. Production in the Green River basin portion of the planning area is mainly from fields located in, and adjacent to, the La Barge Platform-Moxa Arch trend (Law 1995) in eastern Lincoln and Uinta counties and western Sweetwater County. Productive reservoirs range from Paleozoic through Tertiary in age and are predominantly sandstone.

The faulted and folded strata of the Overthrust Belt contain many structural traps for hydrocarbons in the subsurface. Twenty-nine oil and gas fields have been identified in the Thrust Belt Province in traps found in three of the major thrust systems (Powers 1995). In the Overthrust portion of the planning area, oil and gas production is centered in the area of Evanston and to the north, primarily in Uinta County; however, some production occurs in Lincoln County as well.

The majority of federal mineral estate in the planning area (1,118,602 acres or 71%) is considered by the BLM to have low development potential for oil and gas resources. Approximately 315,651 acres (20%)

of federal mineral estate in the planning area are classified as moderate and 112,160 (8%) are classified as high development potential for oil and gas. An area of moderate oil and gas potential is located in the eastern part of the planning area in Uinta, Lincoln, and Sweetwater counties. A map showing oil and gas potential for the planning area is available in the Final Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas (BLM 2006b). A smaller area of moderate potential is in Uinta and Lincoln counties in the southwestern part of the planning area. The areas of moderate potential are bordered by locations considered to have low potential.

The majority of technically recoverable federal natural gas resources within the planning area are either administratively unavailable for leasing or available subject to constraints. About one-third of the potential federal resources are off limits, with about 1 percent administratively unavailable by statute. All leases issued have some restrictions (i.e., standard lease stipulations); however, some leases may be issued with additional restrictions (i.e., major or moderate constraints).

Another mode of occurrence for natural gas is CBNG, where the gas is trapped in the coal where it was generated. CBNG has become an economically important source of gas production, particularly in the San Juan basin of New Mexico and Powder River basin of Wyoming. The 2006 RFD contains a more detailed explanation of these processes (BLM 2006b), as well as identifying important oil- and gas-producing formations.

In the planning area, CBNG potential is relatively low, but is addressed in the 2006 RFD (BLM 2006b). Areas with low potential for CBNG resources are concentrated in the central portion of the planning area along the eastern edge of the Overthrust Belt. Two additional low-potential areas have been identified in the southwestern Wyoming Province portion of the planning area. The remainder of the area is considered to have no potential for CBNG.

Exploration activity for CBNG in the southwestern Wyoming Province as a whole has been low to moderate. Drilling activity has focused outside the planning area in the Rock Springs Formation and at other locations (Law 1995). The high water content of the coal has been an obstacle to economic gas production.

Several CBNG wells have been drilled on fee or state lands and one well on federal mineral estate. Additional CBNG well development may occur in the planning area if pilot-scale testing is successful.

Leasing procedures for oil, non-CBNG, and CBNG are the same. Based on the federal Onshore Oil and Gas Leasing Reform Act of 1987, all parcels must be subject to competitive sale. Lands that do not receive competitive interest are available for noncompetitive leasing for a period not to exceed 2 years. Competitive sales are held at least quarterly and by oral auction. Competitive and noncompetitive leases are issued for a term of 10 years. If the lessee establishes hydrocarbon production, the competitive and noncompetitive leases can be held for as long as oil or gas is produced. The federal government receives yearly rental fees on nonproducing leases. The State of Wyoming also receives half of all money generated from the sale and rental of oil and gas leases. Royalty on production is received on produced leases, one-half of which is returned to the State of Wyoming. According to the RFD scenario for oil and gas, approximately 1.1-million acres of 1.6-million acres of BLM-administered mineral estate in the planning area are covered by oil and gas leases (BLM 2006b).

After acquiring an oil and gas lease, and prior to development, an application for permit to drill (APD) must be filed with the Wyoming Oil and Gas Conservation Commission (WOGCC) and the BLM Kemmerer Field Office if the well is located on a federal oil and gas lease in the planning area. If BLM holds the mineral lease, but not the surface estate, permitting is done under the BLM's APD process. BLM requires a good faith effort for the operator to reach a Surface Use Agreement with the surface

owner. However, if no agreements are reached the operator must post a bond to ensure proper reclamation of the surface. If BLM holds the surface estate but does not hold the mineral estate the drilling permit is authorized by the WOGCC and BLM issues the operator a right-of-way for the surface use necessary for mineral development. Once the permit is approved, the company may proceed with drilling according to the applicable oil and gas lease stipulations and any site-specific conditions of approval that are applied to the permit at the time of approval.

The BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the WOGCC is responsible for authorizing all operations on state and private surface land, except exploration authorized under a lease. Geophysical operations are authorized using guidance from BLM Handbook 3150-1 and the Wyoming Supplemental Handbook to 3150. Operators may apply for geophysical projects using Form 3150-4 (Notice of Intent to Conduct Oil and Gas Geophysical Exploration Operations), or if the project is located entirely on-lease geophysical operations can be applied for and authorized under a Sundry Notice (Form 3160-5). Geophysical operations occur on leased and unleased lands and are authorized on a case-by-case basis. Conditions of approval are added to the project based on site-specific reviews in order to minimize the impacts to various resources.

As of 2003, 58 oil and gas fields were named and producing within the planning area. Table 3-5 shows production for the 58 oil and gas fields, which occurred wholly or partially within the planning area, by basin, as of 2003 (BLM 2006b).

Oil and gas reserves, both proven and potential, can be evaluated using different methods and assumptions. With the continuing increase in demand, a number of studies identify where and how much oil and gas remains to develop. The most comprehensive of these studies, completed by the U.S. Geological Survey (USGS) in 1996, looked at potential onshore oil and gas reserves in the United States. Other studies, completed since the USGS study, focus on a particular geographic region or basin. The RFD scenario for oil and gas (BLM 2006b) describes studies pertaining to the planning area, including their assumptions and results. Table 3-6 is a distillation of the RFD discussion and shows the range of estimates made for oil and gas reserves in the planning area.

The oil and gas industry impacts the economy of the planning area. Employment and income follow the drilling and production cycle, which follows the prices for oil and gas. These relationships are discussed in more detail in the Socioeconomic Resources section of this document. The baseline unconstrained RFD scenario for oil and gas projects approximately 2,040 wells (947 federal and 1,093 state and fee) to be developed in the planning area between 2001 and 2020. Similarly, the unconstrained RFD projects 640 wells (274 federal and 366 state and fee) will be drilled for CBNG in the planning area by 2020 (BLM 2006b).

One method used to locate oil and gas reserves is geophysical exploration—a tool of the oil and gas industry involving bouncing shock waves off subsurface rock layers to determine their thickness and geometry. Shock waves are produced by an energy source and instruments record the waves when they return to the surface. The energy typically comes from the detonation of explosives in a shallow drill hole or from a heavy weight either dropped or vibrated on the ground surface. The resulting shock waves are picked up through a line of sensors, or geophones, connected to a recording truck. Geophysical exploration is done using existing roads, when feasible, but also requires off-road travel.

Generally, there are two kinds of seismic surveys: two-dimensional (2-D) and three-dimensional (3-D). The 2-D surveys comprise single or multiple linear lines with their receivers and source points in the same line extending up to several miles in length, whereas 3-D surveys are conducted over a grid pattern and their source lines and receiver lines are separate. As a result, 3-D surveys can encompass more than 100 square miles.

Table 3-5. Field Statistics for Oil and Gas Production in the Kemmerer Planning Area as of 2003

Field	Gas (mcf)	Oil (bbls)	Water (bbls)
Wyoming Oil And Gas Conservation Commission—Green River Basin			
Church Buttes	288,306,279	1,280,469	1,549,957
Willow Creek	410,635	66	1,276
Emigrant Springs	42,615,564	758,302	293,478
Opal	1,963,669	35,150	2,624
Moxa	6,284,808	10,965	21,433
Wilson Ranch	122,537,355	1,107,024	267,406
Bruff	743,517,641	4,273,020	3,136,255
Shute Creek	55,606,236	821,548	459,934
Storm Shelter	12,641,006	300,115	121,283
Verne	10,110,824	158,322	65,159
Whiskey Butte	169,011,591	1,431,292	644,770
Black Jack	2,778,387	91,269	13,056
Fabian Ditch	142,120,420	739,923	368,309
Sevenmile Gulch	21,459,770	165,610	55,004
Craven Creek	4,693,217	2,233	11,119
Opal Bench	1,888	0	0
Pipeline Crossing	379,854	2,044	4,394
Wild Hare Gulch	3,593,046	46,322	26,108
Henry	71,706,249	5,142,325	370,834
Big Dry Creek	812,592	62,816	14,298
Hickey Mountain	64,221	56,539	2,106
Graham Reservoir	338,020	642,692	435,419
Henry South	4,151,037	642,030	58,546
Luckey Ditch	69,351,345	9,447,331	2,125,838
Milich Ditch	1,585	7,900	1,752
Cow Hollow	106,940,099	1,472,865	596,800
Dog Spring	382,894	2,930	1,112
Taylor Ranch	6,105,418	513,147	167,707
Whiskey Springs	25,844,440	3,247,680	664,041
Legacy	1,019,244	278,854	490,509
Zeigler's Wash	3,132,886	38,741	19,863
Sugarloaf Butte	3,358,254	970,852	7,956
Dodge Rim	137,503	15,350	5,321
Trumpeter	128,481	12,336	2,673
Haven	4,031,935	97,103	61,333
Total Production	**1,925,538,393**	**33,875,165**	**12,067,673**
Wyoming Oil And Gas Conservation Commission—Prospect-Darby-Hogsback Thrust			
Spring Valley	613	60,950	83,847
Aspen	3	2,588	958
Stove Creek	0	593	0
Sulphur Creek	0	1,316	1,269
Horse Trap	1,585,753	6,194	670
Elkol	239	248	100
Lazeart	0	1,358	114
Total Production	**1,586,608**	**73,247**	**86,958**
Wyoming Oil And Gas Conservation Commission—Absaroka Thrust			
Ryckman Creek	462,646,499	33,438,553	31,107,942
Yellow Creek	62,651,528	2,770,169	1,961,934
Painter Reservoir	1,177,286,105	65,922,030	47,580,651
Whitney Canyon-Carter Creek	721,290,747	9,528,037	1,121,912
Clear Creek	163,281,787	6,291,590	12,088,213
Glasscock Hollow	16,018,170	2,805,166	5,709,907
Road Hollow	45,960,001	1,784,297	266,487
Thomas Canyon	0	2,382	15,291
Woodruff Narrows	3,832,920	21,290	67,634
Anschutz Ranch East	48,940,450	2,416,574	22,265,905

Table 3-5. Field Statistics for Oil and Gas Production in the Kemmerer Planning Area as of 2003 *(Continued)*

Field	Gas (mcf)	Oil (bbls)	Water (bbls)
Shurtleff Creek	66,142	14,287	808
Bessie Bottom	1,484,682	152,516	430,917
Chicken Creek	5,652,530	927,529	4,700,355
Session Mountain	12,922,198	158,105	13,927
Painter Reservoir East	1,093,030,917	87,658,448	14,417,091
Collett Creek	3,532,447	793,299	42,717
Total Production	**3,818,597,123**	**214,684,272**	**141,791,691**

Source: BLM 2006b (Report date: 12/31/03)
bbls barrels
mcf thousand cubic feet

Table 3-6. Summary of Oil and Gas Reserve Estimates for the Kemmerer Planning Area

	Gas – Bcf	Oil – MMB	NGL – MMB
Estimated Mean Technically Recoverable Resource Quantities			
Green River Basin/ Moxa Arch Oil and Gas	857	0	26
Green River Basin/ Moxa Arch CBNG	–	0	0
Northern Thrust Oil and Gas	1553	72	245
Northern Thrust CBNG	–	0	0
Cretaceous Stratigraphic Oil and Gas	5	49	0
Cretaceous Stratigraphic CBNG	–	0	0
Crawford Meade Thrust Oil and Gas	32	0	0
Crawford Meade Thrust CBNG	–	0	0
Hogsback Thrust Oil and Gas	335	44	10
Hogsback Thrust CBNG	–	0	0
Absaroka Thrust Oil and Gas	938	171	148
Absaroka Thrust CBNG	–	0	0

Source: LAW 1995
– Estimates for CBNG are not available
Bcf billion cubic feet
CBNG coalbed natural gas
MMB million barrels
NGL natural gas liquids

The BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the WOGCC is responsible for authorizing all operations on state and private surface land, except exploration authorized under a lease. At the leasing stage, standard oil and gas stipulations apply (see Appendix H). Refer to Map 19 for existing oil and gas leases.

Management challenges for the oil and gas program include conflict resolution between mineral resource programs (e.g., oil and gas vs. trona) and complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for oil and gas generally address those areas administratively available and (or) administratively unavailable for leasing. Constraints on oil and gas development typically result from

management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.3 Leasable – Coal

Wyoming has the largest federal coal program in the BLM and is the Nation's largest producer of coal, with about 34 percent of the Nation's coal production. Most Wyoming coal is used for steam generation in the electrical utility industry. The planning area contains bituminous and sub-bituminous deposits. Coal begins as a buildup of carbonaceous plant matter associated with freshwater lowland swamps.

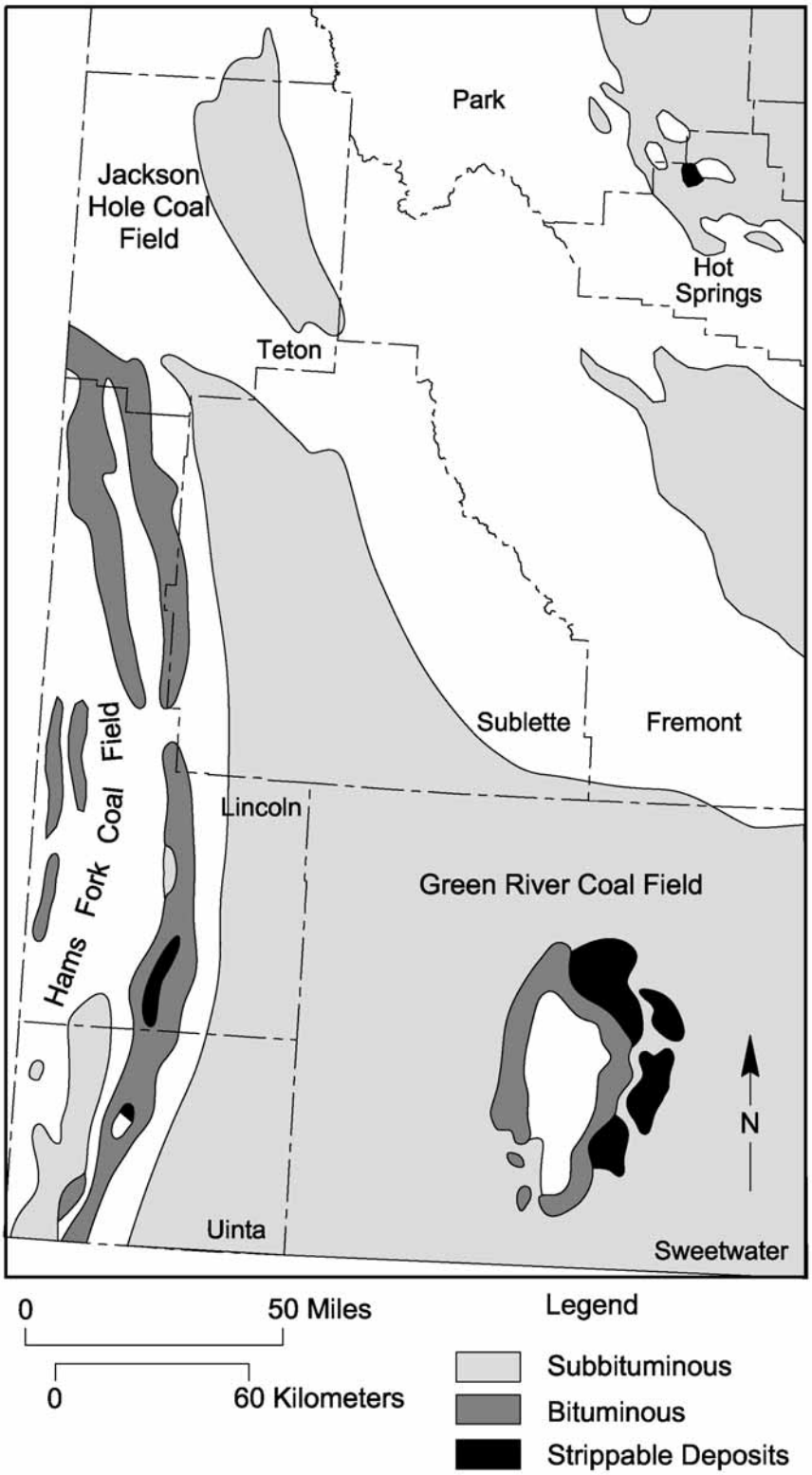
Primary coal reserves occur in the Adaville, Evanston, and Frontier formations of Cretaceous age. Outcrops of coal-bearing formations in the planning area are confined to the Overthrust portion of the area and occur mainly in three north-south-trending belts. The reserves in the Adaville Formation are estimated at 1-billion tons, based on 13 of the formation's coal seams. One seam in the Adaville Formation exceeds 100 feet in thickness; another 17 seams appear to be greater than 6-feet thick. Adaville Formation coal currently is being mined at Pittsburg and Midway (P&M) Coal Mining Company's surface mine near Kemmerer. Frontier Formation coals, not presently being mined, have a higher British Thermal Unit (BTU) value than the Adaville coals and contain beds up to 20-feet thick (Glass 1976). The Frontier Formation was extensively mined using underground methods up until the 1950s. Coal reserves in the planning area occur in two major regional coal fields: the Hams Fork Coal Field and the western portion of the Green River Coal Field. Coal production currently is occurring only in the Hams Fork Coal Field at the P&M Kemmerer Mine. Map D shows regional coal fields that overlap the planning area.

The Green River Coal Field covers the largest area in Wyoming, with 16,800-square miles containing more than 1.46-trillion tons of coal (BLM 2004a). The far western edge of this coal region overlaps the eastern portion of the planning area; however, coal deposits in the Green River coal region portion of the planning area are buried by younger formations, and no surface or underground mining of those coalbeds has occurred. The only named coal field in the western portion of the Green River basin is the La Barge Ridge field in portions of Lincoln and Sublette counties, located outside the planning area.

The Hams Fork Coal Field is Wyoming's fifth largest coal region. The field extends from southwestern Teton County into Lincoln County, western Sublette County, and the western half of Uinta County. It is a narrow elongate field within the Overthrust Belt of western Wyoming (Salt River and Wyoming Ranges) (University of Wyoming 2003). The Hams Fork Coal Field contains sub-bituminous and bituminous coals suitable for mining using both surface and underground methods. The Hams Fork coal region includes the Salt River Range, Greys River Coal Field, Wyoming Range, the McDougal Coal Field, and the Kemmerer Coal Field.

The presence of coal in the Green River region of the planning area was the primary factor for UPRR's decision to build a rail line through southern Wyoming in the 1860s (State of Wyoming 2001). The railway created a demand for coal, as well as the means for transporting it to other regions. By the end of 1868, the railroad had reached as far west as Evanston (State of Wyoming 2001). Coal was discovered on Hams Fork, near Kemmerer, in 1868 (State of Wyoming 2001). High quality coal was known to be in the area based on federal surveys in 1874. Hams Fork Coal Company (later the Diamond Coal and Coke Company, a subsidiary of Anaconda Copper Company) was established during this time (Wyoming Tails and Trails 2003). Coal mining began near Kemmerer when UPRR opened a mine at Twin Creek in 1881 and completed a spur track to Kemmerer in 1885 (City of Kemmerer 2003). However, mining did not begin in earnest until 1897 when the Kemmerer Coal Company was founded. After trains switched to diesel engines in the 1950s, most underground coal mines shut down.

Map D. Kemmerer Planning Area Regional Coal Fields



Source: BLM 2004a

Open-pit mining in the planning area began in 1963 (University of Wyoming 2003). Current federal coal production is centered in Lincoln County west of Kemmerer. The only production from the Hams Fork Coal Region is within the planning area. The fields are characterized by coal reserves ranging from 9,000 to 11,000 BTU/pound and 0.4 percent to 0.9 percent sulfur. The reserves are characterized by steeply dipping seams that have been mined by underground methods in the past, but are currently mined using surface methods only. The relatively thin and divided nature of the seams and the steep dip results in higher mining costs for these seams. The only major surface mining company at this time is P&M, which operates a mine west of Kemmerer. P&M has 8,679 acres of federal coal leases, produced 4.6-million tons of coal in 2005, and has a planned production of 4.5- to 5-million tons per year in the near future. This coal is produced from multiple seams in the Adaville Formation. The coalbeds dip about 20 degrees and the coal is extracted using truck and shovel surface-mining methods. The Kemmerer Mine is the largest and deepest open-pit coal mine in the nation.

In 1997, FMC Corporation's Skull Point Mine was located next to the Kemmerer Mine. The Skull Point Mine was later acquired by P&M (UPRR 2003). Chevron Texaco acquired P&M in 2003 (City of Kemmerer 2003). In general, the coal at this mine has a heat content of BTU of 9,889 per pound, a sulfur content of 0.95 percent, a moisture content of 22 percent, a volatile material content of 34 percent, and a fixed carbon content of 39.5 percent; these values vary throughout the mine area. Table 3-7 lists coal production at the Kemmerer Mine from 2001 through 2005.

Table 3-7. Kemmerer Mine Production, 2001 - 2005

Year	2001	2002	2003	2004	2005
Coal Produced (million tons)	4.5	4.2	4.1	4.5	4.6

Source: SIM 2005

Coal exploration is allowed on all federal lands in the planning area other than the Raymond Mountain Wilderness Study Area (WSA). Exploration on federal lands is subject to the requirements and conditions of the coal exploration license process, the result being a set of project-specific stipulations and conditions designed to limit impacts from exploration on other resources. Before the area can be considered for leasing, the amount of overburden, volume and quality of coal, and other information needed to plan a mine must be gathered. The BLM Solid Minerals Group in the Rock Springs Field Office has the primary responsibility for all coal operations within both the Rock Springs and Kemmerer planning areas (including inspection and enforcement) on federal lands.

Table 3-8 summarizes leasable coal areas by type. Lands that are nominated for coal leasing, which is done under a process called Lease By Application (LBA), are subject to a review known as the coal-screening process which is described in 43 CFR 3420.1-4 (see the *Coal Screening Summary Report* available at www.blm.gov/rmp/kemmerer/).

Table 3-8. 2003 Mined and Unmined Leasable Coal Areas (acres)

	Leased	Unmined	Mined/No Coal
Federal Coal	8,679	8,431	248
Lease By Application	0	3,963	0
State/Private Coal	–	–	2,180
Total	–	–	2,428

Source: Clawson 2003

– Data not available

The four steps of the coal screening process are:

1. Identify areas of federal coal with development potential.
2. Apply the unsuitability criteria listed in 43 CFR 3461.
3. Identify other multiple-use conflicts.
4. Consult with qualified surface owners.

These four screens are described in 43 CFR 3420.1-4(e)(1-4). The areas of federal coal that pass through these screens are identified as acceptable for further consideration for leasing. The BLM compiled a Coal Screening Summary Report in July 2004, which describes application of the screens for the Kemmerer planning area in detail. The paragraphs and tables below briefly summarize the results.

Step 1: Identify areas of federal coal with development potential

In 2003, BLM published a Notice of Intent to revise the Kemmerer RMP in the Federal Register. This notice included a call for parties interested in coal leasing and development to submit coal resource data for their areas of interest. The only area of interest was the current Haystack federal lease application area (LBA), which covers 300 acres in Section 30, T. 17 N., R. 117 W., containing an estimated 16,500,000 tons of recoverable coal. The BLM identified a total of six sections (3,963 acres) of federal coal under BLM surface in the LBA and surrounding vicinity as having coal development potential based on previous coal leasing in the area, past and present mining proposals and exploration, and data contained in U.S. Geological Survey Coal Resource Occurrence-Coal Development Potential maps.

Step 2: Apply the unsuitability criteria listed in 43 CFR 3461, as follows:

Criterion 1 - Federal Land Systems; Criterion 2 - Rights-of-Way and Easements; Criterion 3 - Dwellings/Roads/Cemeteries/Public Buildings; Criterion 4 -Wilderness Study Areas; Criterion 5 - Visual Resources; Criterion 6 - Scientific Studies; Criterion 7 - National Register of Historic Places; Criterion 8 - National Natural Landmarks; Criterion 9 - Federally-Listed Endangered Species Habitat; Criterion 10 - State-Listed Endangered Species Habitat; Criterion 11 - Bald and Golden Eagle Nest Sites; Criterion 12 - Bald and Golden Eagle Roosts; Criterion 13 - Falcon Cliff Nesting Sites; Criterion 14 - Migratory Bird Habitat; Criterion 15; Habitat for State High-Interest Wildlife and Plants; Criterion 16 - Riverine/Coastal and Special Floodplains; Criterion 17 - Municipal Watersheds; Criterion 18 - National Resource Waters; Criterion 19 - Alluvial Valley Floors; and Criterion 20 – Criteria proposed by a State or Indian Tribe and adopted by U.S. Department of the Interior (USDI).

Of the 20 unsuitability criteria, only those in Table 3-9 had affected acreage in the analysis area.

Table 3-9. Acres or Facilities Potentially Affected by the Unsuitability Criteria in the Kemmerer Planning Area

Criterion	Potentially Affected Acres or Facilities
No. 2 – Rights-of-way and Easements	1 gas pipeline 1 electric utility line
No. 7 – National Register of Historic Places	447.5 acres (sites potentially eligible for listing)
No. 9 – Federally Listed Endangered Species Habitat	3,318 acres (black-footed ferret habitat)
No. 11 – Bald and Golden Eagle Nest Sites	1,557 acres (nests with ½-mile buffer)
No. 15 – Habitat for State High-Interest Wildlife and Plants	3,348 acres (crucial big game winter range) 1,125 acres (greater sage grouse leks with ½-mile buffer)

No areas were found to be unsuitable for leasing under any of the criteria after exemptions and exceptions under 43 CFR 3461 were applied. However, the criteria listed above may require special lease or mine permit stipulations to mitigate identified concerns. Some overlap exists between areas covered by different criteria.

Step 3: Identify other multiple-use conflicts

The third screen involved a multiple use conflict evaluation of values other than those contained in the unsuitability criteria. For example, paleontological features, BLM sensitive species, wetlands, and oil and gas development were some of the values examined under the multiple use conflict evaluation. No areas were found to be unacceptable for coal development as a result of the analysis. The following resources may require special lease or mine permit stipulations to mitigate identified concerns (Table 3-10). Some overlap exists between areas identified for the different topics.

Table 3-10. Areas that May Require Special Lease or Mine Permit Stipulations to Mitigate the Multiple Use Conflict in the Kemmerer Planning Area

Multiple Use Conflict	Area Potentially Affected
Oil and gas development	3,963 acres (all of the LBA)
Archeological areas	447 acres
Wetlands	See Figure 12 of Coal Screening Summary Report (BLM 2004b)
Native American sensitive sites	680 acres

Step 4: Consult with qualified surface owners

This fourth screen identifies areas where a significant number of qualified surface owners over federal coal have expressed a preference against surface mining. Since none of the lands involve split-estate (private surface over federal coal), the fourth screen was not relevant to the analysis and no acres were deleted from further consideration for leasing due to this screen. The surface of all the screened lands is managed by BLM.

Acres of unleased federal coal that went through the screening process are shown in Table 3-11:

Table 3-11. Acres of Unleased Federal Coal Processed through the Coal Screening Process

Coal Planning Screen	Acres
Federal coal with development potential	3,963 (LBA)
Areas deleted by unsuitability criteria	0
Areas deleted due to multiple use conflicts	0
Areas deleted by surface owner consultation	0
Total areas of federal coal acceptable for further consideration for leasing	3,963

Although no lands were found unsuitable or unacceptable for further consideration for leasing, the analysis revealed that the lands within the review area need certain conditional requirements or mitigating measures to be considered acceptable for further consideration for leasing. Those measures are summarized below:

1. Mitigation of impacts of proposed mining to cultural sites, and consultation with Native American tribes.
2. Protection or relocation of existing utility lines.

3. Resolving possible oil and gas/coal conflicts through appropriate lease stipulations on new oil and gas and coal leases.
4. Conducting new field investigations to determine if certain methods of coal mining can occur without having a long-term adverse effect on select wildlife, and especially on threatened and endangered species. This includes, but is not limited to surveying any areas proposed to be leased to determine if they may support a BLM sensitive or state or federally listed endangered species. If any such species were found, such lands would be acceptable for further consideration for leasing only with a provision that appropriate mitigation measures will be developed that will protect the long-term interests of the species and habitats involved. Prior to leasing, surveys will be completed for bald and golden eagle roosts and nests, falcon cliff nesting sites, and birds protected under the Migratory Bird Treaty Act and of high federal interest. Mitigation measures may include, but are not limited to, seasonal operations in some areas, buffer zones around occupied eagle or falcon nests, habitat improvement or development, special reclamation measures, or other appropriate measures for long-term habitat protection. Mitigating measures will be combined with appropriate mining methods to manage the potential adverse effects of mining in critical big game winter range. Sage grouse habitat areas will require appropriate mitigating measures for coal exploration, development, and ancillary facilities.

Future LBAs, if any, will be reviewed by the BLM on a case-by-case basis using the coal screening process.

Management challenges for the coal program include conflict resolution between mineral resource programs (e.g., oil and gas vs. coal) and complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for coal identify areas of federal coal acceptable for further lease consideration. Restrictions on coal result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.4 Leasable – Sodium (Trona)

The world's largest known trona deposit is located in southwestern Wyoming and extends into the eastern portion of the planning area (BLM 2004a). All trona in the planning area is mined underground. Trona is a hydrous sodium carbonate mineral refined into soda ash, sodium bicarbonate, sodium sulfite, sodium tripolyphosphate, and chemical caustic soda (WSGS 2002). Soda ash is the trade name for sodium carbonate, a chemical obtained from trona and sodium-carbonate-bearing brines (USGS 2003a). Soda ash is used in a wide variety of applications: glass production accounts for 48 percent of the domestic use; the chemical industry accounts for 26 percent; soap and detergents, 14 percent; and other users, such as the pulp and paper, water treatment industries, and the manufacture of baking soda, make up the remaining 12 percent (WSGS 2002). Soda ash can be synthetically manufactured from salt and limestone, both of which are practically inexhaustible; however, synthetic soda ash is more costly to produce and generates environmentally harmful wastes (USGS 2003a).

Trona resources found on federal lands are considered leasable minerals. The area where trona is known to exceed 4 feet in thickness is part of the Known Sodium Leasing Area (KSLA), which covers about 1,100 square miles, half of which is in the eastern portion of the planning area (see Volume 2, Map 13).

All public lands within the KSLA currently not leased are available for leasing consideration. Sodium leases are subject to renewal every 10 years after the initial 20-year term. Prospecting permits outside of the KSLA are considered and modified when necessary to ensure consistency with the objectives of protecting other resources. Prospecting permits may be denied if it is determined that exploration or development impacts are inconsistent with other resource management objectives. In addition to

prospecting permits for sodium, exploration licenses may be issued within the KSLA for sodium lands that are not currently leased.

The Kemmerer Field Office is involved in developing mitigating measures for prospecting permits, trona leases, and surface-disturbing activities on those leases. In addition, the Solid Minerals group in Rock Springs is responsible for managing trona in the KSLA, including operations within the planning area (Clawson 2003). The group comprises geologists, mining engineers, and environmental specialists. Its primary responsibilities include processing new lease applications and post leasing actions. A large component of the group's activity is to conduct inspections of active mines. At a minimum, all active mines are inspected on a quarterly basis and all leases are inspected annually. The group also carries out production verification inspections to confirm that the lessee's reported extraction values are correct. Through the preparation of environmental documents, the Kemmerer Field Office provides input to the Solid Minerals group regarding surface resources impacted by trona development.

Currently, a study is being conducted regarding safety issues associated with oil and gas drilling within or near active trona mining areas. As a result, existing oil and gas leases in the Mechanically Mineable Trona Area (MMTA) have been suspended since 1995, and no new oil and gas leases are being issued in the MMTA pending completion of the study. The MMTA is an area generally defined by active trona mining, as well as various geologic factors, including trona bed thickness, depth below the surface, and purity.

The trona is found in the Green River Formation of Eocene age. The Wilkins Peak Member of the Green River Formation includes at least 42 trona beds, occurring from 400 to 3,500 feet below the surface. In the trona deposition area, which extends outside the planning area, there are about 36 billion tons of halite-free trona, and 25 billion tons of mixed trona and halite, that occur in beds more than 1.8 meters in thickness (USGS 2007).

Ninety percent of the Nation's trona production and 30 percent of the world's soda ash production comes from southwestern Wyoming, with four of the five underground mines in the planning area. Trona mining began in southwestern Wyoming in 1947. Wyoming production of trona in 2005 totaled more than 13-million short tons. About 1.8 tons of trona are required to produce 1 ton of soda ash. Approximately 35 percent of Wyoming soda ash production is exported to other countries. According to the American Natural Soda Ash Corporation, approximately 4.41-million short tons of soda ash were exported from Wyoming in 2000 (WSGS 2002).

Within the planning area, FMC Wyoming Corporation, General Chemical Corporation, and Solvay Minerals, Inc., produce trona from four underground mines. The FMC Granger Mine is being operated as a solution mine because the conventionally operated Granger Mine workings are flooded with water; therefore, the saturated solution is pumped to the Granger Soda Ash Plant for recovery. Solution mining represents only a small fraction of total production. Most trona production is by conventional room and pillar as well as longwall mining. FMC Westvaco and General Chemical mines have separate facilities for underground solution mining of trona (drawing water with dissolved trona from the underground workings), both of which are temporarily shut down. Three trona lessors (federal, state, and private) have issued leases within the KSLA in the Granger/Little America area. Table 3-12 shows trona production by mine in 2005.

In addition to numerous sodium leases for trona, there is a sodium lease for halite (sodium chloride) in the planning area located about 50 miles northwest of Kemmerer on a small salt spring in the Bridger-Teton National Forest. Some intermittent production of salt brine has occurred for use as a binder on roads.

Table 3-12. Trona Production by Mine, 2005

Mine Name	County	Facilities Operated	Production (estimated tons)
Granger Mine/FMC Wyoming Corporation	Sweetwater	Underground Mine Processing	130,000
Westvaco Mine/FMC Wyoming Corporation	Sweetwater	Underground Mine Processing	4.7 million
Alchem Mine/General Chemical Corporation	Sweetwater	Underground Mine Processing	4.7 million
Solvay Trona Mine/ Solvay Chemicals, Inc.	Sweetwater	Underground Mine Processing	4.0 million
Total: Underground Mines: 13.53 million tons			

Source: SIM 2005

Restrictions on trona leasing and development generally result from management actions identified in other resource programs. Management challenges involve surface tailings disposal, air quality, and multiple mineral development conflicts, primarily between oil and gas and trona. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.5 Leasable – Other Solid Leasables

Other than coal and trona, solid leasable minerals in the planning area include oil shale and phosphate. Access to BLM-administered leasable minerals is at the BLM's discretion.

The Green River basin contains an estimated 244-billion barrels of shale oil in the Tipton Shale Member, Wilkins Peak Member, and Laney Member of the Green River Formation. This estimate is based on oil shale that yields at least 15 gallons of oil per ton of rock. Oil shale occurs throughout most of the Green River basin and in thin beds (less than 4-feet thick) in Fossil basin. The most notable oil shale resources in the Kemmerer Field Office are located toward the southeastern boundary of the area around Flaming Gorge Reservoir. The beds in the upper part of the Tipton Shale are up to 75-feet thick and yield up to 24 gallons of oil per ton. Overburden is 2,000- to 3,000-feet thick. Other important oil shale beds in the Wilkins Peak Member and the Laney Member are slightly to the east of the southeast border of the Kemmerer planning area.

The Kemmerer Field Office contains areas of oil shale resources. There are at present no regulations in place for leasing oil shale, nor any existing oil shale leases. Lands containing oil shale resources were originally identified through an inventory that portrayed the occurrence of the Green River geologic formation in Utah, Wyoming, and Colorado. Once identified, lands containing oil shale resources were withdrawn from mineral entry through a 1930 Executive Order, which was later modified to allow for oil, gas, and sodium leasing. Since that time, the economic potential for the oil shale resource has been further defined, now comprising a smaller area in the three states.

When the Kemmerer Resource Management Plan (revision) was initiated in 2003, there was no reasonable foreseeable development expectation for oil shale over the life of the plan. The mineral report identified this resource, but did not foresee any future leasing or development due to lack of regulations as well as prevailing and anticipated economic factors.

In light of this legislative requirement, all decisions related to oil shale leasing in this Resource Management Plan are being deferred to the ongoing Programmatic EIS and Plan Amendments for Oil Shale and Tar Sands Resources Leasing on Lands Administered by the BLM in Colorado, Utah, and Wyoming (USDI 2005b). The Record of Decision on the final Programmatic EIS will amend the existing plan by making allocation decisions on whether or not to allow leasing and future development of oil shale on public lands for those areas where the resource is present. For oil shale, the scope of the Programmatic EIS analysis will include the entire extent of the Green River, Washakie, Uinta, and Piceance Creek basins (USDI 2005b). These decisions will amend the Kemmerer RMP. Additional

opportunities for public involvement and comment will occur when the Programmatic EIS becomes available in draft form (USDI 2005b). Site-specific requirements will be addressed in future National Environmental Protection Act (42 United States Code [USC] § 4321 et seq.) (NEPA) analysis for individual project applications after the Programmatic EIS is completed.

Areas containing known deposits of oil shale are available for oil shale lease consideration where it is not inconsistent with existing laws and regulations, Executive Orders (EOs), and Areas of Critical Environmental Concern (ACECs). Oil shale leasing will not be considered in areas where it would jeopardize the safe operation of existing trona mines.

Phosphate rock and associated vanadium occurs at the surface in north-south-trending outcrops of the Phosphoria Formation, located in the Overthrust portion of the planning area. Mining has occurred in the past in various surface and underground mines, beginning with an underground mine near Cokeville in 1906, which had the first production in Wyoming. The last federal phosphate leases in the Kemmerer Field Office area, relinquished in 1995, were located in the Sublette Range north of Cokeville, Wyoming. Currently, most phosphate rock production in the United States is from Florida, North Carolina, Utah, and Idaho. Currently, no production of phosphate occurs in the planning area.

Prospecting permits for phosphate will be considered in all areas. Appropriate stipulations will be added to protect other resources. Prospecting permits for phosphate may be denied if it is determined that impacts from exploration or development are inconsistent with the objectives of the RMP. If prospecting eventually leads to leasing, those leases will be conditioned to avoid adverse impacts to other resources.

Management challenges for other solid leasable minerals generally are related to program management issues, such as complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for other solid leasables generally address areas open and (or) closed for leasing. Restrictions on development of other solid leasables result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.6 Salable

Salable minerals, also known as mineral materials, include common variety materials, such as sand, stone, gravel, pumice, pumicite, cinders and clay, as well as petrified wood. The Kemmerer Field Office administers the permits for salable minerals. The office maintains two community pits and one common use area, which provide relatively small amounts of mineral materials to the public using nonexclusive contracts. Those contracts generally are for sand and gravel, shale, moss rock, and boulders. The Kemmerer Field Office also issues exclusive use permits when the request is to obtain mineral materials from a specific location as an exclusive permittee. This is done as a “Free Use Permit” (usually for government entities such as city, county, or state) or as a commercial sale. The sale may be noncompetitive or involve bids at a competitive sale if the volume is above 200,000 cubic yards or there is competitive interest in the deposit. Depending on the size and nature of a sale or Free Use Permit, a mining and reclamation bond may be required. Another method to dispose of mineral materials, particularly borrow material and sand and gravel, is the Material Site ROW. The Wyoming Department of Transportation (WYDOT) uses Material Site ROW to obtain salable minerals from the BLM for road construction that involves federal funds.

Table 3-13 shows the number of active sales, quantity produced, and values of mineral materials produced in fiscal year (FY) 2003 (BLM 2003a). Table 3-14 displays the production statistics of salable minerals according to type of disposal in the planning area for FY 2003.

Table 3-13. Mineral Material Disposal Types and Commodities for Fiscal Year 2003

Type of Disposal	Number of Sites	Total Amount Authorized	Commodity	Comments
Negotiated Sales (active cases)	1	98,000 cubic yards	Borrow	None
Competitive Sales (active cases)	0	0	N/A	None
BLM Common Use Area	1	996 tons since 1998	Mostly moss rock, some boulders	None
Material Sites ROW	19	Unknown	Sand and gravel and limestone	Issued to Wyoming DOT
BLM Giraffe Creek Community Pit	1	1,160 cubic yards since 1998	Limestone	Talus
BLM Cokeville Community Pit	1	300 cubic yards since 1998	Limestone	Talus
BLM Willow Springs Community Pit	1	20 cubic yards since 1998	Sand and gravel	Pit closed
Free Use Permit (active cases)	3	38,000 cubic yards since 1998	Sand and gravel	Two permits to Lincoln County, one permit to Uinta County

Source: McNaughton 2003
BLM Bureau of Land Management
DOT Department of Transportation
N/A Not Applicable
ROW rights-of-way

Table 3-14. Salable Mineral Production in the Kemmerer Planning Area for Fiscal Year 2003

Type of Disposal	Number of Permits	Quantity Produced	Value ($)
Community Pit Sales	4	520 cubic yards	$130
Common Use Area Sales	10	291 tons	$2,910
Negotiated Sales	0	0	0
Competitive Sales	0	0	0
Free Use Permits	1	10,000 cubic yards	$7,500

Source: BLM 2003i

The following sections describe the primary salable minerals of the planning area, including sand and gravel, decorative stone, and limestone and sandstone. Most salable minerals are common construction materials; the demand for these materials is linked to the area's economy. Aggregate (sand and gravel) demand is expected to remain high. Aggregate is one of the most widely used salable resources in Wyoming and in the planning area (WSGS 2005b). The four types of sand and gravel deposits in the planning area include alluvial sand and gravel from recent stream deposits, glacial sand and gravel in the southern portion of the planning area, Quaternary terrace gravels, and older sand and gravel deposits of the Late Cretaceous to Pleistocene age.

The primary sand and gravel deposits in the planning area are in the Star Valley (Salt River drainage) and along other major drainages, including the Bear River, Blacks Fork, Smiths Fork, Hams Fork, and Green River. There are three free-use permit areas for county governments and numerous Material Site ROW issued to the Wyoming DOT. Material sites can be authorized for federal aid highway projects. The Kemmerer Field Office has averaged 14 salable mineral authorizations per year over the last 4 years, including negotiated sales such as those in community pits and the common use area, free use permits, and authorizations for exploration. Numerous older gravel pits occur throughout the area, many of which were originally issued to the Wyoming DOT.

Salable

Decorative stone is defined as "any type of rock product exclusive of aggregate that is used for its color or appearance" (Harris 1993). Currently, building stone and moss rock is being produced, though other varieties of decorative stone have been produced in the past. An active market has developed for moss rock, or lichen-covered sandstone, which is mainly found on hogback ridges in the Overthrust Belt portion of the planning area. Current production and demand for building stone and moss rock is expected to continue at their current rates.

About 1,000 tons of moss rock have been sold from public land in the planning area since 1998. This demand continues, especially from the Jackson Hole area and the Wasatch Front area in Northern Utah. In 2003, 520 tons were sold from scattered locations in the Overthrust Belt portion of the planning area.

Substantial commercial limestone or sandstone production (other than decorative stone) in the planning area is not expected. Salable limestone is an abundant resource within the planning area; however, there is currently minimal production. Other than relatively small amounts of limestone produced from the Giraffe Creek Community Pit, there are no commercial sales of limestone in the planning area. The Wyoming DOT does however, have a limestone quarry on public land under a Material Site ROW.

Mineral materials are basic natural resources used in construction; however, they generally are bulky and have low unit prices. The sheer weight of mineral materials results in high transportation costs. Adequate local supplies of these basic resources are important to the area's economy. The BLM's policy is to make these materials available to the public and local government agencies whenever possible and wherever it is environmentally acceptable. Additional information on salable minerals may be found in the *Mineral Assessment Report 2004* (BLM 2004a).

Management actions for salable minerals generally address areas closed to mineral material disposal. Restrictions on salable minerals result from actions identified in other resource programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.3 Fire and Fuels Management

The Kemmerer Field Office fire management program focuses on two categories of fires: unplanned and planned. Unplanned or wildland fire occurs as the result of an act of nature (e.g., lightning), human accident, or by intent to cause damage. Planned or prescribed fire is used in a controlled manner for specific purposes, such as improving habitats and plant community health and reducing hazardous fuels. Stabilization and (or) rehabilitation may occur following wildland fire. This section describes current management and conditions in the planning area for wildland fire, prescribed fire, and stabilization and rehabilitation.

The wildland fire season generally runs from July to October. Prescribed fires are usually planned for periods following the peak of wildland fire season. Prescribed fire or wildland fire use implies that fire effects are favorable to the resource managed under a specified set of environmental criteria (prescriptions). Planned ignitions imply a planned fire intended to enhance the resource targeted for treatment (e.g., vegetation). Prescribed fire has been used extensively and successfully in the planning area to improve plant communities. From 1995 to 2005, prescribed burns averaged 4,300 acres per year in the Kemmerer planning area. Lightning accounts for most wildland fires in the planning area followed by human-caused fires from fireworks, woodcutting, and campfires.

The planning area is included within the Rawlins Interagency Dispatch Center jurisdiction, the western zone fire suppression response zone, and the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). An annual operating plan is developed between the Kemmerer Field Office and Lincoln, Uinta, and Sweetwater counties to establish operating procedures for coordinated responses and cooperative sharing of resources. The BLM coordinates with the Bridger Teton National Forest, NPS, Fossil Butte National Monument, U.S. Fish and Wildlife Service (USFWS), Seedskadee National Wildlife Refuge, Wyoming State Forestry Division, and the Wyoming Game and Fish Department (WGFD) to ensure compliance with interagency policy and procedure requirements. The BLM also coordinates with private landowners, as needed.

The planning area includes a variety of vegetation communities that vary in their response to fire. For example, sagebrush and grassland communities in the lower elevations and mixed conifer stands in higher elevations are susceptible to fire. In sagebrush and grassland communities, fuel sources include dead vegetation and litter. In mixed conifer stands, fuel sources include dead and felled timber or standing timber with fuel loading due to historic fire suppression and drought. Aspen is not as susceptible to fire as conifers and other woodland species; however, it will burn and carry fire during the late fall and under drought conditions.

Table 3-15 shows historical wildland fire occurrence and fire size between 1980 and 2002 in the planning area. An average of five to six wildland fires per year have occurred in the planning area over the period 1980 to 2002. Acres burned have ranged in size from less than 1 acre to more than 13,000 acres.

Over the past 100 years, fire exclusion in the planning area caused the general buildup of vegetative fuels and deadwood. In addition, drought conditions in recent years have caused vegetation to be less resistant to fire. Historic fire exclusion in the planning area has altered composition of vegetation communities, as well as natural fire regimes. For example, fire exclusion has allowed sagebrush and juniper communities to dominate some sites, causing a reduction in grass and forb production. In forested areas, suppression activities have increased fuel buildup, saplings, and small, early seral stage trees, making these areas more prone to catastrophic fires.

Table 3-15. Wildland Fire History in the Kemmerer Planning Area, Wyoming (1980 to 2002)

Year	Fire Occurrence	Total Acres	Year	Fire Occurrence	Total Acres
1980	5	422	1992	8	75
1981	18	13,573	1993	2	112
1982	3	181	1994	10	2,213
1983	3	104	1995	0	0
1984	1	0	1996	3	92
1985	18	1,371	1997	0	0
1986	2	11	1998	3	60
1987	4	1,621	1999	4	305
1988	15	8,051	2000	7	1,829
1989	4	21	2001	4	77
1990	4	706	2002	2	3,508
1991	2	100	-	-	-
			Total	122 Fires	34,432

Source: BLM 2003a

Under the existing plan, fire suppression is used to protect resource values and areas. Examples of resources or areas protected from wildland fire under the existing plan include the following:

- Communities
- Campgrounds and other developed recreational areas
- Rock art, cultural sites, and historic structures
- Commercial timber where hazardous fuels exist
- Oil and gas fields and related facilities, utilities, and road ROW
- Lands with intermingled federal, state, and private ownership where currently no agreements for using wildland fire as a resource management tool
- Other areas, as identified through continued public involvement in the fire management planning effort.

Under the existing plan, general fire management objectives and strategies for BLM-administered lands in the planning area include, but are not limited to, the following:

- Wildland fire use and prescribed fire will be used to achieve resource objectives identified to reduce hazardous accumulations of fuels.
- Use of heavy equipment for fire management will be minimized and vehicle tracks, fire lines, and emergency access routes may be stabilized to prevent erosion and continued use.
- The BLM will promote public education regarding fire management, including restrictions on the use of fire on public lands.
- All trespass fires (unauthorized human-caused fires on public lands) will be suppressed and responsible parties will be required to pay compensation for all suppression costs.
- Wildland and prescribed fires will be managed in all vegetation types to maintain or improve biological diversity and health of public lands.
- Burned areas will be monitored for the control of noxious weeds. Vegetation treatments and other follow-up management actions will be used, as needed, to prevent the spread of noxious weeds.
- Burned areas will be assessed for Burned Area Emergency Stabilization and Rehabilitation needs.

Under the existing plan, specific fire management objectives and strategies or an appropriate management response are identified for BLM-administered land by nine fire management units comprising the planning area (see Volume 2, Map 20) (BLM 1998b). Fire management units are delineated using broad factors, such as fire frequency, elevation, vegetation, and values at risk, and include the following:

- KFO1 – Star Valley
- KFO2 – Raymond Mountain Wilderness Study Area
- KFO3 – Smiths Fork
- KFO4 – Rock Creek/Slate Creek
- KFO5 – North Cumberland
- KFO6 – Bear River Divide/Carter
- KFO7 – Evanston/Bridger Valley
- KFO8 – South Bridger
- KFO9 – Moxa

3.3.1 Unplanned/Wildland Fire

The BLM in Wyoming emphasizes an appropriate management response (AMR) to wildland fires based on consideration of firefighter and public safety, anticipated management costs, resource values at risk, resource benefits, threats to private property, opportunities for reducing hazardous fuels, criteria for fire management units, and political and social concerns. AMR involves a wide range of fire management options, including wildland fire use, confining or containing a wildland fire so it stays within a predetermined boundary, or aggressively and quickly suppressing the fire. On BLM-administered lands within the planning area, wildland fire is managed to improve natural resources. To reduce wildland fire management costs and increase resource benefits, fires will be allowed to burn up to natural fuel breaks, when feasible.

An essential component of the Kemmerer Field Office's fire management program is protection of the public and property from the adverse impacts of wildland fires; however, unplanned fire can sometimes serve as a management tool to benefit natural resources. For example, the BLM's Fire Management Implementation Plan (BLM 1998b) states, "A naturally-caused fire occurring during favorable conditions in an area with a prescribed burn plan could be treated as a prescribed fire."

Minimal impact suppression techniques and restrictions or prohibitions on the use of heavy equipment will be applied in WSAs and in other identified sensitive areas. All wildland fires are assessed to identify emergency stabilization and rehabilitation needs. In some parts of the planning area, disturbance of soil from fire and suppression activities has resulted in establishment of invasive nonnative species (INNS). See the INNS section of this document for additional discussion.

One objective of the BLM's fire management program in the planning area is to reduce hazardous fuel loads (i.e., the amount of easily ignited vegetation in an area, usually expressed in tons per acre) with an emphasis on the wildland-urban interface (WUI). The WUI includes any area with residential, industrial, or agricultural structures interspersed with or located adjacent to trees and other combustible vegetation. In areas of mixed ownership, modification of vegetative fuels on public land alone would not result in a substantial reduction of the threat of wildland fire to private lands and homes; cooperation among all landowners is required.

3.3.2 Planned/Prescribed Fire

Prescribed fire currently is used to improve natural resource conditions and reduce hazardous fuels where management objectives have not been met by wildland fire or other vegetation treatments. The Kemmerer Field Office uses prescribed fire in combination with other vegetation treatments, as appropriate, including manual, mechanical, biological, and chemical methods. Prescribed fire is also used to create fuel breaks and reduce hazardous fuels, especially in the spring and late fall when vegetation is dormant and soil moisture is elevated. A naturally caused fire occurring during favorable conditions in an area with a prescribed burn plan can be treated as a prescribed fire.

General objectives for fuel treatments include removal of excessive brush or woodland canopy in mosaic patterns. The percentage of brush or canopy removed depends on the resource management objectives for the area, including wildlife habitat needs and watershed improvement. Management objectives for the juniper and limber pine woodlands include promoting age class diversity and reducing woodland invasion into more productive grasslands and commercial forests.

3.3.3 Stabilization and Rehabilitation

Full suppression provides the most effective and flexible tactics to suppress unplanned fire; however, use of heavy equipment can cause damage to wildlife habitats, soil erosion, water quality degradation, and the spread of INNS. Full suppression also encompasses the use of fire retardant or foam; however, current practice limits the use of retardant or foam within 200 feet of waterways and in the vicinity of significant cultural resources. In areas where full suppression may impact sensitive natural resources, limited suppression tactics may be utilized. Stabilization and rehabilitation may be used in the planning area to offset the adverse impacts of fire and fire suppression. Fire suppression on public lands is guided by objectives in the existing plan and clarified by the annually updated *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). The Healthy Forests Initiative, Healthy Forest Restoration Act, and the National Fire Plan 2000 influence the BLM's approach to forest health and fire management in the planning area.

No specific stabilization and rehabilitation decisions exist in the present plan; therefore, stabilization and rehabilitation are conducted on a case-by-case basis and will follow the policy outlined in the *U.S. Department of the Interior Burned Area Emergency Stabilization and Rehabilitation Handbook.* Stabilization and rehabilitation may be necessary following wildland fire to address the following:

- Emergency stabilization and rehabilitation. The BLM will identify actions to stabilize or rehabilitate burned areas, such as seeding, fencing, and temporary closures.
- INNS. Burned areas and areas subject to fire suppression usually offer an opportunity for the spread of INNS. Pre- and post-fire management is crucial and, as within WUI areas, depends on a cooperative approach by landowners and land users.

Management challenges related to fire include the ability of the BLM to control fire; use wildland fire for the benefit of resources when it does not threaten life or property; manage natural fire regimes and fire return intervals; potential unintended impacts of fire on visibility and public health; use fire as a resource management tool; manage fire in the WUI; link together fire management activities and resource management goals and objectives; consider natural fire regimes, fire return intervals, and desired future vegetative types; the impacts of fire through the spread of INNS and habitat for wildlife and special status species; post-fire livestock grazing management and rest; and continue coordination and training with local volunteer fire departments. For example, the BLM's fire management strategies must recognize the role of wildland fire as an essential ecologic process. At the same time, these strategies must also consider firefighter and public safety, suppression costs, the resource values to be protected, and be consistent with resource program objectives. While protecting of human life is the overriding priority in the BLM's fire management decisions, the BLM also considers community infrastructure, private

property, natural and cultural resources, and social, economic, and political factors. For example, BLM policy is that livestock grazing is not allowed on a burned area for a minimum of two growing seasons after the fire is extinguished. This policy, land ownership patterns, and the economic impact of rest from grazing for two growing seasons limit the number of prescribed fire projects occurring on grazing allotments in the planning area. Management actions addressing these challenges are incorporated in the alternatives and described in more detail in Chapter 2.

3.4 Biological Resources

This section describes the affected environment (i.e., existing conditions) for habitat fragmentation, biological diversity, and individual biological resources (i.e., vegetation, fish, wildlife, special status species, and INNS). Habitat fragmentation and biological diversity are not considered resources or resource uses; rather, they reflect conditions within the planning area that can be impacted (beneficially or adversely) by BLM management actions and allowable uses, as expressed in the alternatives (see Chapter 2). Therefore, the existing conditions of habitat fragmentation and biological diversity are described in this section. Following these descriptions, the existing conditions of individual biological resources are described, beginning with vegetation and followed by fish and wildlife and special status species.

Due to the complexity of biological resources and the vast size of the planning area, this section does not attempt to provide an encyclopedic description of all vegetation, fish, wildlife, and special status species; rather, based on issues identified during the scoping process and BLM's MSA, this section focuses on existing biological resource conditions in the planning area, which may be further impacted (beneficially or adversely) by alternatives. Chapter 4, Environmental Consequences, describes the potential environmental consequences (i.e., impacts) of each alternative related to individual biological resources.

Habitat Fragmentation

Habitat fragmentation involves the division of large contiguous areas of habitat into smaller patches (fragments) isolated from one another (Johnson 2001). As blocks of habitat are repeatedly dissected into smaller blocks, adverse impacts, including reduction in total habitat available, increased edge effects, and isolation from other habitats or populations can occur. Actions that result in habitat loss are exacerbated when fragmentation reduces the size and (or) isolates remaining habitat patches below size thresholds necessary to support particular species. Habitat fragments may eventually become too small, too isolated, and too influenced by edge effect to maintain viable populations of some species, resulting in a loss of biological diversity (Johnson 2001). Edge effects influence habitats near the boundaries between natural and disturbed or developed land. These effects occur at various distances from disturbances in the form of changes in noise, sunlight, wind, water runoff, humidity, and often plant composition, depending on the contrast of environments created by the edge. Edges also can provide habitats for INNS, both plants and animals, which are detrimental to the native species in the adjacent parcel. Species requiring the largest home ranges are generally the first species to decline when habitat fragmentation occurs.

Historic sources of habitat fragmentation within the planning area include homestead development, agriculture, irrigation, fencing, and minerals development, starting in the late 1880s. Subsequent development of the region in the early-to-mid 1900s included establishing the railroad and a road network to connect population centers. In the late 1900s, ever-increasing rural development of homes, recreational properties (the WUI), and energy development have further fragmented planning area habitats.

Currently, the planning area is primarily fragmented by linear features including roads, railroads, trails, irrigation systems, and ROW. I-80 and a network of state highways, county roads, local roads on private and public lands, and the UPRR dissect much of the planning area. The associated construction, maintenance, and use of these features, along with well pads, pipelines, and powerlines, has fragmented many of the larger habitat blocks in the planning area. The development of irrigation reservoirs and districts with their associated water-distribution systems also has contributed to habitat fragmentation in the planning area. Irrigation water development has diverted scarce water supplies from native plant communities to hayfields, pasture, and cropland, thereby further reducing the productivity of habitats. Fences can block migration routes for some wildlife species, such as pronghorn, resulting in preventing or changing access to some habitats. Existing pipeline and powerline corridors are also a source of habitat fragmentation, especially when they do not follow road ROW.

In addition to linear features, fragmentation also occurs at population centers and other developments where humans live, recreate, and work. Developing large private parcels bordering BLM-administered lands has, in some instances, contributed to habitat fragmentation by native land conversion to subdivisions or smaller ranchettes. This type of land conversion primarily occurs near population centers and the WUI. Buildings, roads, fences, and utility corridors associated with residential and commercial developments all have contributed to fragmentation of planning area habitats.

Resource development and management, including fire and fuels management, harvest of forest and woodland products, and minerals extraction, also can be a source of fragmentation (refer to the individual sections in this chapter for additional details on these resources). Conducting prescribed burns and managing wildland fire have sometimes contributed to temporary habitat fragmentation in the planning area with the removal of aboveground vegetation by fire or for firebreaks. Intense and large-area fires temporarily can isolate individual species and communities of plants and less mobile species of animals. A frequent fire-return interval often associated with INNS can effectively fragment habitat over the long term. Similar to fire, mechanical vegetative treatments generally have been temporary in nature on public lands, usually consisting of small acreages. OHV use also contributes to habitat fragmentation through the vegetative and soils disturbance created by often-used trails and roads, trampling of native plants, displacement of wildlife, and potential transportation of INNS seeds into undisturbed areas. Management actions to address these challenges are incorporated in the alternatives for biological resources in Chapter 2. Common and scientific names of plant and wildlife species identified in this Draft EIS are listed in Appendix E.

Biological Diversity

The Keystone Center (1991) defines four elements of biological diversity relating to scale:

1. Genetic diversity
2. Species diversity
3. Community or ecosystem diversity
4. Landscape or regional diversity.

Biological diversity is a complex subject that makes the measurement of existing conditions difficult. Species diversity is probably the most recognizable and easily understood element of biological diversity and, for this RMP revision, is defined as the variety of species found in the planning area. In other words, species diversity includes the numbers and distribution of all species in the planning area. This includes species (e.g., cottontail rabbits, coyotes, elk, pronghorn, etc.) that are common and plentiful, as well as other species (e.g., western bladderpod, mountain plover, bald eagle, etc.) that are less common or rare. Classifying rare species as sensitive, threatened, or endangered is one way of conserving biological diversity because these classifications heighten awareness for conservation of rare species.

Spatial and temporal scales also are important considerations for conserving biological diversity. For example, nonmigratory populations of mammals are sometimes temporarily diminished following a harsh winter and limited food supply. In addition, migratory birds may return to breeding grounds with diminished populations due to the stress factors associated with migration. In these instances, the lower number of individuals does not necessarily equate to a reduction in biological diversity in the planning area because the number of individuals ultimately (all else being equal) return to pre-winter levels. Permanent reductions in the four elements of diversity listed above are considered adverse impacts to biological diversity for this RMP revision.

Counting the number and relative frequency of species occupying an area over time is one means of identifying reductions in species diversity; however, this approach can be overly simplistic and does not necessarily address the other three elements of diversity. Currently, there is no single, commonly accepted scientific protocol for measuring biological diversity. Nevertheless, it is generally accepted that

"…reducing the number of biological entities in a system or making some of them less abundant reduces diversity" (Langner and Flather 1994). Biological diversity in the planning area is currently addressed by strategies such as the BLM's National Sage-Grouse Habitat Conservation Strategy.

Climatic factors (e.g., drought), disease, fire regime, predation, competition, and population cycles all have contributed to the current natural variability in number and relative frequency of individuals, species, and communities of plants and animals in the planning area. Other factors contributing to natural variability include surface-disturbing activities (e.g., road and well pad construction), the physical and chemical environment (e.g., soil nutrients and water), adjacent area vegetation (e.g., croplands), historic vegetation, INNS, herbivory (e.g., native ungulates and livestock), and the planning area's existing vegetation.

The current condition for biological diversity in the planning area is a function of physical factors (e.g., soils, geology, air, water, geography, and elevation), natural factors (e.g., fire, drought, disease, evolution), and human actions. In the context of these physical and natural factors, biological diversity evolved over time to produce the diversity present in the planning area prior to Anglo settlement. Human actions during the subsequent 140 years changed the pattern, composition, structure, and function of plant and animal communities within the planning area, thus affecting the pre-Anglo biologically diverse settlement. Management challenges for biological diversity include competing resources and resource uses. Management actions to address these challenges are incorporated in alternatives for physical and biological resources and for fire and fuels management in Chapter 2.

Vegetation

Vegetation types used by the BLM are broad classifications dominated by communities of shrubs, trees, forbs, and grasses. These broad vegetation types are an expression of the wide range of climatic and soil conditions found throughout the planning area (Map 21).

Table 3-16 summarizes the extent of the vegetation types and plant communities within the planning area. Existing conditions for three categories of vegetation types (forests and forest products, grassland and shrublands, and riparian and wetland communities) that occur in the planning area are described in the following sections.

Other lands within the planning area identified in Table 3-16 include bare ground (alpine and basin-exposed rock soils) and disturbed areas altered by human use, including irrigated and dry-land crops, surface-mining operations, and human settlements.

Alpine bare rock and soil include cliffs, spires, and talus fields occurring in all mountain ranges within the State of Wyoming. Basin bare rock and soil include naturally occurring areas of bare rock and soil where total cover of vegetation is less than 15 percent, such as cliffs, spires, rock outcrops, and talus fields, as well as steep scarps of soft rock. Basin bare rock can be found in any of the Wyoming basins. The bare ground category of vegetation types occupies about 3 percent of the planning area. Disturbed areas, including agriculture, active mining, and urban areas, occupy about 7 percent of the planning area.

The following is a description of the plant communities for the planning area from "GAP" vegetation information, information provided by BLM resource specialists, and other references, as noted.

Table 3-16. Vegetation Types in the Kemmerer Planning Area

Vegetation Type	Total Acres	BLM Surface Acres	BLM Mineral Estate Acres
Forest Types			
Conifer	563,834	41,965	54,846
Aspen	163,538	36,274	54,432
Juniper Woodland	95,442	36,075	41,368
Grassland/Shrublands			
Grassland	14,536	345	1,326
Meadows	144,437	662	1,097
Sagebrush	2,095,198	1,049,350	1,162,304
Desert Shrubs	295,180	153,649	143,911
Mountain Shrubs	26,446	18,565	19,413
Greasewood Fans and Flats	14,435	10,296	10,260
Bare Ground	123,290	48,405	48,328
Riparian/Wetland	104,395	13,609	18,475
Disturbed (Altered by Humans)	276,127	11,437	20,953
Unknown*	14,326	3,373	2,649
TOTAL	**3,931,184**	**1,424,005**	**1,579,362**

Source: BLM 2006a

*Areas not specifically identified in the Geographic Information System (GIS) overlay represent less than 1 percent of the planning area.

Note: Acreages in this table are derived through GIS analysis of available GAP vegetation data. GAP vegetation data has not been ground-truthed and provides only a rough approximation of the size of each habitat type in the planning area. Acreages of forestlands and woodlands available for BLM management may be more accurately represented to include approximately 19,008 acres of forestlands and approximately 15,000 acres of woodlands; and an additional approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA (BLM 1985).

3.4.1 Vegetation – Forests, Woodlands, and Forest Products

Forest and Woodland Communities

The conifer forest communities, about 14 percent of the planning area, consist of lodgepole pine, Douglas-fir, spruce-fir, spruce-fir/lodgepole pine mixed aspen, and clear cut areas. Lodgepole pine dominates the canopy in the lodgepole pine forest with subalpine fir and Engelmann spruce mixed with the canopy trees on most sites. This forest community is widely distributed throughout Wyoming with the exception of the Black Hills. Douglas-fir is dominant in both intact Douglas-fir forests and Douglas-fir forests influenced by logging. Douglas-fir forests are found along the foothills of most of the major mountain ranges in Wyoming, but are most common and extensive in the northwest. Engelmann spruce and (or) subalpine fir are dominant or codominant in the canopy of the spruce-fir forest, which is an important forest type in the mountain ranges of Wyoming, with the exception of the Black Hills. At the lower end of its elevation range, this community is found in relatively cool, mesic sites, such as north-facing slopes and along riparian corridors in canyons. It can also be mixed with aspen at lower elevation ranges. Subalpine fir tends to be dominant at lower elevations, with Engelmann spruce gaining importance toward the tree line. Spruce-fir/lodgepole pine mixed aspen forest communities exhibit spruce-fir/lodgepole pine as a major understory and co-dominant component which, with time and lack of fire and other natural disturbances, eventually will succeed aspen and dominate the canopy and become the major species in these stands. These forests are found throughout all the mountains ranges. Clear-cut conifer communities are areas within conifer forests substantially altered by logging. This community comprises clear-cut areas within a matrix of conifer forests and, as such, is a mosaic of standing forest and

logged areas with logged areas covering more than 40 percent of the total ground area. The logged areas may be in early succession stages, but are not classified as forest until regenerated new trees achieve 25 percent canopy closure.

In the planning area, conifer forestlands are located in the mountains north of Kemmerer, Wyoming, in the Tunp Range, Sublette Range, and Commissary Ridge areas, and south of Mountain View, Wyoming, on the lower north slope of the Uinta Mountains. Based on GAP vegetation data the conifer forestland within the planning area comprises about 41,965 acres and includes stringers and fringe areas bordering larger contiguous blocks of forest on adjacent USFS administered land. The BLM administered conifer forestlands delineated for management are approximately comprised of lodgepole pine (51%), Douglas-fir (17%), spruce-fir/lodgepole pine mixed aspen (17%), alpine fir/Engelmann spruce (15%), and less than 1 percent of limber pine. Sawtimber-sized trees are found on approximately 56 percent of the forestlands (BLM 2003a). Bark beetles cause mortality throughout the entire range of forestlands, with pockets of bark beetles in epidemic levels located in various areas of the Commissary and Dempsey Ridge areas (BLM 2003a). Forest pathogens are discussed further in the INNS section of the document.

Approximately 56 percent of the BLM administered conifer forestlands are stocked with mature sawtimber-sized trees averaging around 120 years in age. Growing stock volumes per acre average 2,500 cubic feet for lodgepole pine, 1,800 cubic feet for Douglas-fir, and 1,950 cubic feet for subalpine fir/Engelmann spruce (BLM 2003a). Annual growth per acre averages around 50 cubic feet per acre per year in the sawtimber component and 72 cubic feet per acre per year in the poletimber component. Annual mortality per acre per year averages around 14 cubic feet for all species combined (BLM 2003a).

Aspen woodlands, or aspen forestlands with a major conifer component, include areas where aspen is the dominant tree species. Aspen communities occur in mountain foothills and in high valleys throughout Wyoming wherever the environment is sufficiently mesic. Aspen also can be found in riparian zones in foothills. Aspen stands typically exhibit a diversity of understory vegetation, and are utilized by wildlife and livestock. They also serve as a natural fire break, and often occur as part of an important riparian and wetland component of the forested ecosystem. Aspen stands appear to be declining throughout the interior west, due to advanced age and/or conifer invasion (Bartos and Campbell 1998; Kulakowski et al. 2004 Knight 2001; WSFD 2001) Many of these stands also have declined due to ungulate use and the lack of fire (to control competition and stimulate regeneration). According to a report on forest health published by the Wyoming State Forestry Division, the average age of aspen forests and woodlands in the State of Wyoming is 68 years (WSFD 2001).

Juniper woodlands are found in foothills and rocky outcrops in most of Wyoming in association with big sagebrush, limber pine, and mountain mahogany species. The juniper woodlands include Rocky Mountain juniper and Utah juniper. Juniper encroaches into and dominates sagebrush communities after long periods without fire. In the planning area, aspen is intermixed with the conifer forestlands, and is scattered on mid-elevation ridges and hillsides often in pure stands. The juniper woodlands are located in the hills and escarpments east of Evanston and south of Kemmerer, Wyoming. Based on GAP vegetation data, there are approximately 72,349 acres of combined woodlands (juniper and aspen) within the planning area.

Forest Products

Since 1984, the BLM has harvested approximately 8-million board feet of sawtimber from 500 acres of administered lodgepole pine forestlands throughout the planning area (BLM 2003a). The BLM harvested the timber using the clear-cut harvest method. All clear-cut forestlands have successfully regenerated, and approximately 350 acres are ready for precommercial thinning to optimize growing conditions (BLM 2003a).

Approximately 250 cords of fuelwood, 50 Christmas trees, and 1,000 post and poles are sold annually from BLM-administered forestland within the planning area. Virtually no forest products are harvested from the aspen and juniper woodlands (BLM 2003a).

Management of Forests and Woodlands

In the mid 1980's, a stand-based inventory was conducted on BLM lands and approximately 19,008 acres of forestlands were identified as suitable for long-term commercial management (BLM 1985). These forestlands were comprised of 9,727 acres of lodgepole pine, 3,202 acres of Douglas-fir, 3,144 acres of aspen with a considerable conifer component comprised of spruce-fir and/or lodgepole pine, 2,901 acres of subalpine fir/Engelmann spruce, and 34 acres of limber pine. The forestlands determined suitable for commercial management were stratified into stands and intensively inventoried using the U.S. Forest Service Region 2, Stage II system. The data was compiled, and growth and harvest yields were calculated. Long-term sustained yield harvest schedules were generated, under various prescription alternatives, using the FORPLAN computer planning model. This planning model is used to estimate the long range productive capability of the forestlands under the prescription selected for an upper limit on the harvest level to ensure that the inventory of growing stock trees is not depleted. Under an "Accelerated Harvest" solution that allows harvesting high risk timber sooner and reaching the long term sustained yield level earlier, the harvest levels for the first and second decades could theoretically be 2,624 thousand cubic feet (MCF), or approximately 11.8 million board feet (MMBF), from 1,782 acres, and 2,549 MCF, or 11.5 MMBF from 1,486 acres, respectively. Harvest levels in future decades could increase and average around 4,000 MCF, or 18 MMBF. The proposed timber harvest level alternatives are considerably lower due to multiple use considerations, primarily involving lynx analysis unit (LAU) management guidelines, and elk management guidelines for escape cover and calving areas. Canada lynx are listed as threatened under the Endangered Species Act (ESA), and any forest management activity must not adversely impact this species. Canada lynx and elk are discussed in more detail in the Special Status Species section and the Fish and Wildlife Resources – Wildlife section.

An additional combined acreage of around 3,000 acres of forestland and woodland is located within the Raymond Mountain WSA. Currently, no management action is prescribed for these forest and woodlands. Alternatives for "reserve management" (prescribed fire or wildland fire use with no mechanical surface-disturbing activities) to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives, have been developed. Another 80 acres of forestland is not available for management due to forest clearing for ski runs at the Pine Creek ski area west of Cokeville, Wyoming.

Woodlands of aspen and juniper on BLM administered surface, according to GAP vegetation data, are estimated at around 70,000 acres. Currently, no management action is prescribed for the woodlands. Alternatives, identifying 15,000 acres of woodland available for management, have been developed to create more historical conditions in terms of stocking, and structure/composition. Woodland products are provided as a byproduct consistent with woodland health, landscape restoration, and reduction of forest fuels objectives.

Currently, no management guidelines are prescribed for old growth forests. Alternatives have been developed to permit old growth management under the Healthy Forests Restoration Act (HFRA) authorities. The BLM-administered forestlands currently available for harvest treatments, serve as habitats for Canada lynx. Canada lynx are listed as threatened under the ESA and any forest management activities must not adversely impact this species. In addition, elk management guidelines for escape cover and calving areas complicate management. Canada lynx and elk are discussed in more detail in the Special Status Species section and the Fish and Wildlife Resources – Wildlife section, respectively.

3.4.2 Vegetation – Grassland and Shrubland Communities

Surface-disturbing activities, livestock grazing, fire or fire suppression, and INNS have influenced most grassland and shrubland communities in the planning area. See also the Livestock Grazing, Fire and Fuels Management, and Vegetation – Invasive Nonnative Species sections of this document.

Grassland make up less than 1 percent of the planning area and include the Great Basin foothills grassland and mixed grass prairie cover types. Great Basin foothills grassland is a mesic grass-forb mix found in the foothills of northwestern Wyoming and includes species such as bluebunch wheatgrass, arrowleaf balsamroot, silvery lupine, Idaho fescue, spike fescue, Richardson's geranium, and avens-old man's whiskers. Mixed grass prairie contains a mixture of short and tall grass prairie species, but does not contain buffalo grass, an indicator of short grass prairie. Grass species that occur in mixed grass prairies include western wheatgrass, needle and thread, Indian ricegrass, and prairie junegrass. Shrub/subshrub species include Douglas rabbitbrush, winterfat, horsebrush, and prickly-pear cactus. When mixed grass prairie occurs in patches intermixed with shrub species (i.e. big sagebrush), grass patches must occupy more than 50 percent of the landscape for the primary vegetation type to be classified as a mixed grass prairie community. The vegetation type may also contain or be dominated by silver sagebrush. With the exception of silver sagebrush, trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

Meadows

Meadows occupy approximately 4 percent of the planning area and include subalpine meadow and grass dominated wetland cover types. Subalpine meadows occur in mountain parks within and below the upper treeline and include species such as American bistort, dwarf lewisia, alpine timothy, hairy arnica, slender wheatgrass, spiketrisetum, tufted hairgrass, and oatgrass. Grass-dominated wetlands comprise only a small percentage of the meadow habitat within the planning area and include nonriverine wetlands, such as wet and moist meadow grassland, marsh and swamp wetlands, cattail, bullrush and sedge-dominated wetlands, and inland saltgrass/alkali sacaton-dominated wetlands. Representative species include alkali sacaton, cattail, inland saltgrass, Baltic rush, and alkali cordgrass. Within both meadow cover types, trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

Sagebrush

Sagebrush communities include areas dominated by Wyoming big sagebrush and mountain big sagebrush and occupy the majority (53 percent) of the planning area. The Wyoming big sagebrush plant community is a shrubsteppe type, with Wyoming big sagebrush being the dominant shrub and total shrub cover comprising more than 25 percent of the vegetative cover. This plant community is variable in Wyoming and includes the full range—from dense, homogeneous Wyoming big sagebrush to sparsely vegetated arid areas where Wyoming big sagebrush is the dominant shrub. Often, patches of Wyoming big sagebrush are found with patches of mixed grasses. In these cases, the community is classified as Wyoming big sagebrush steppe if the sagebrush patches occupy more than 50 percent of the total landscape area and as mixed grass if the grasses occupy more than 50 percent of the total area. Wyoming big sagebrush is found throughout most of the state, with the exception of the extreme southeast corner. Often, rolling landscapes may feature Wyoming big sagebrush dominating broad slopes, but with sand sagebrush or various cushion plants on wind-swept ridges and knolls and with mountain big sagebrush in hollows. These landscapes are complex mixtures of several sagebrush-dominated types, but when dominated by Wyoming big sagebrush, they are classified as this type.

The mountain big sagebrush plant community is dominated by mountain big sagebrush, often found with mixed grasses, with a total shrub cover comprising more than 25 percent of the vegetative cover. Sometimes this shrub type occurs as patches of dense sagebrush with patches of mixed grasses. Currently, the sagebrush patches comprise more than 50 percent of the total landscape area categorized as

mountain big sagebrush. This community is widespread in the mountain ranges and higher valleys of Wyoming (BLM 2003a) and is found throughout the state, except east of the Laramie Range. Mountain big sagebrush occupies cooler sites than basin big sagebrush and more mesic sites than Wyoming big sagebrush, often occurs in mountain parks and is intermixed with trees, and is found at the lower margin of the treeline.

Desert shrubs

The desert shrubs community comprises a mixture of shrub species occurring in dry saline habitats. Shrub cover is often dominated by shadscale and saltbush, but can be a mixture of Gardner's saltbush, black greasewood, and (or) desert cushion plants. When ground cover is pure Gardner's saltbush or pure greasewood, it is classified as such, but when these species are mixed and dominance is unclear, it is classified as desert shrub. This plant community also includes some cushion plant communities found in Wyoming basins. Total shrub cover comprises more than 25 percent of the total vegetative cover. Desert shrub usually is found in flats and fans in the central and western basins of Wyoming. Desert shrubs occupy approximately 5 percent of the planning area.

Mountain shrubs

Mountain shrub communities include xeric and mesic shrublands found on mountain slopes and occupy less than 1 percent of the planning area. In the xeric shrub community, the shrub cover is dominated by species of mountain mahogany, with shrub species comprising more than 25 percent of the vegetative cover. These communities usually occur on dry slopes or flats where bedrock is very close to the surface or outcropping. Xeric shrublands often are found along canyon walls around the margins of mountain ranges or on surfaces formed by tilted sedimentary strata. Xeric shrublands also are found throughout Wyoming at mid-elevations in shallow soils. Soil factors are probably the most important factors in controlling the distribution of these shrublands.

A variety of shrub-dominated communities grow in relatively mesic sites in Wyoming, often in snow catchments or downslope from catchments or in ravines over a wide range of elevation. Most often, Rocky Mountain maple, bigtooth maple, serviceberry, snowberry, wax currant, and (or) chokecherry are dominant or codominant, but other shrub species can be present. Mountain mahogany species cannot be dominant and mesic shrubs must comprise more than 25 percent of the vegetative cover. Mesic shrublands are found in foothill locations and in mesic microenvironments throughout Wyoming.

Greasewood fans and flats

Areas where greasewood comprises more than 75 percent of the total shrub cover and where shrubs comprise more than 25 percent of the vegetative cover are categorized as greasewood fans and flats. This vegetation type often is found mixed with grasses and generally found along streams at low to medium elevations, although it can occur on fine-textured saline upland areas and on basin fans and flats. Greasewood also is frequently found in riparian areas where it may be classified as shrub riparian, with the greasewood community entered as a secondary vegetation type within the polygon. Greasewood fans and flats occupy less than 1 percent of the planning area.

Management of Grasslands and Shrublands

Management challenges for grassland and shrubland communities include the spread of INNS; lack of a natural fire regime; overly mature stands with insufficient recruitment; integrating treatments of multiple resource programs to achieve landscape level objectives; competition for forage between native ungulates and livestock; habitat fragmentation; restoration of areas damaged by surface-disturbing activities to mitigate potential impacts regarding erosion and water quality; and maintaining a distribution and diversity of these communities sufficient to support wildlife, special status species, livestock, and other

competing multiple-use demands on BLM-administered lands. As appropriate, management actions designed to address these challenges were identified during the alternative formulation planning phase and are incorporated in the alternatives described in Chapter 2 of this document.

3.4.3 Vegetation – Riparian and Wetland Communities

Riparian and wetland communities are areas that exhibit persistent water or obligate vegetation (e.g., sedges, rushes, willows) reflecting the availability of surface or groundwater. Vegetation found in these communities typically is adapted to flooding disturbances or saturated (water-logged) soils. Due to their importance in the landscape, wetlands are legally protected under the CWA and are defined and delineated by use of a USACE manual (USACE 1987) to determine the simultaneous presence of specific criteria for soil, water, and vegetation. For the purpose of this discussion, references to wetlands are not restricted to the legal definition.

Riparian areas support more wildlife diversity than any other habitats (WGFD 1999) and are the single most productive wildlife habitat type in Wyoming. Many wildlife species depend on these habitats for all or part of their life-cycle (WGFD 1999). Healthy riparian areas provide vertical structural complexity, canopy, and subcanopy layers, as well as a ground layer that supports species diversity. In addition to being an integral part of watershed health, riparian areas are desired for their recreation, fish and wildlife, water supply, cultural, and historical values, as well as their economic values, which stem from their use for livestock production and mineral extraction (Prichard 1998).

About half the bird species found in riparian habitats are obligate species (Howe et al. 2004). In general, the greater the diversity of habitats along a river or stream, the greater the species diversity of aquatic and riparian biota (Wohl 2004). Riparian habitats support extended forb production and diversity in vegetation and structural complexity, which provides for biological communities rich in insect composition (Connelly et al. 2004). Most birds are insectivores during their breeding season (Howe et al. 2004). Emerging aquatic insects are a large part of the diet of birds using riparian areas (Moline 2004). These factors make riparian areas the most important habitats to avian biodiversity across the West (Howe et al. 2004). Greater sage-grouse depend on riparian areas in the summer for late brood-rearing habitats. After upland forbs expire, greater sage-grouse move into mesic riparian habitats because forbs generally are still available in these areas for several more months (Connelly et al. 2004).

Riparian and wetland communities are more structurally diverse and produce more plant and animal biomass than adjacent uplands in the planning area. Compared to uplands, healthy riparian areas generally are lusher and stay greener for a longer portion of the year (WGFD 1999). Riparian areas, adjacent to flowing (lotic) and standing (lentic) water, form transition zones between aquatic and upland areas and may or may not be jurisdictional wetlands. Jurisdictional wetlands are determined to be present at a location if the following criteria are met: simultaneous occurrence of at least 50-percent hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (USACE 1987). Riparian and wetland communities in the planning area include forest-dominated riparian, grass-dominated wetland, shrub-dominated riparian, and open water.

Riparian zones in which tree species dominate the vegetation of the riparian corridor are categorized as forest-dominated communities. In Wyoming, these are usually cottonwood species, but can also be aspen, boxelder, or a variety of conifer species. Trees must occupy more than 25 percent of the vegetative cover within the riparian zone. Forest-dominated riparian communities are found throughout Wyoming, from basins to treeline. In basins, larger drainages often support trees, while smaller drainages generally support shrubs and grasses.

Riparian zones in which shrubs comprise more than 25 percent of the vegetative cover and in which trees occupy less than 25 percent of the vegetative cover are categorized as shrub-dominated riparian communities. Shrubs often include willow species, sagebrush species, and (or) greasewood, but other

shrubs (e.g., hawthorn, wild plum, birch, alder, tamarisk, shrubby cinquefoil) may be present or dominant. Shrub-dominated communities also include alpine riparian zones dominated by willow species or other shrubs. Shrub-dominated riparian communities are found throughout Wyoming.

Grass-dominated wetlands include nonriverine wetlands with vegetation dominated by grasses or forbs. Trees or shrubs cannot occupy more than 25 percent of the vegetative cover. Grass-dominated wetlands are found throughout Wyoming and include communities such as wet and moist meadow grassland, marsh and swamp wetlands, cattail, bullrush- and sedge-dominated wetlands, and inland saltgrass and alkali sacaton-dominated wetlands. Grass-dominated wetlands also include both low and high salinity wetlands. Cattails, rushes, sedges, and prairie cordgrass characterize low-salinity wetlands. High-salinity wetlands are characterized by alkali sacaton, alkali cordgrass, saltgrass, seablite, wildrye, and wheatgrass.

In addition to native plant species, several INNS are prevalent in riparian areas found in the planning area. INNS have been shown to decrease biological diversity, affect stream functions, degrade the quality of wildlife habitats, and decrease forage production for livestock and wildlife. For more detailed information, see the INNS section of this document.

Nationally, about 70 percent of riparian areas have been lost (Howe et al. 2004). Although riparian areas generally account for less than 1 percent of the total land area in the western United States (Slater and Anderson 2004), the benefits of these vital oases in semiarid environments far exceed the relatively small area they occupy. Despite the relatively small area occupied in the planning area, riparian and wetland communities provide important functions, such as influencing water quality, sustaining base flows, lessening the impact of floods, providing wildlife habitats, and providing forage, shade, and water for livestock (BLM 1991).

Moreover, vegetation found in riparian and wetland areas influences stream communities by shading the stream (reducing water temperature), controlling dissolved nutrient inputs, stabilizing stream banks, and contributing organic matter (Moline 2004). Streamside vegetation provides cover for fish by creating quiet, shaded resting areas beneath overhanging vegetation and contributes material to organic debris jams (Wohl 2004). The roots of riparian vegetation are imperative to the development and maintenance of undercut banks that also provide cover for trout (Wohl 2004). The roots help to stabilize the stream banks, thus reducing siltation in pools and on spawning bars (Wohl 2004). Root stabilization of stream banks also allows soils to absorb extra water during spring runoff that is later released during drier months, thereby improving late summer streamflows (WGFD 1999).

The ability of riparian and wetland areas to provide the functions described in this section depends, in part, on the interactions of water, soil, and vegetation. Streams, wetlands, and their associated riparian areas are shaped by processes through natural adjustments to handle the water and sediment load delivered by the watershed. A healthy riparian-wetland area exhibits resilience to normal variations in water and sediment loads. In other words, these areas can handle increases in stormflows/snowmelt runoff with minimal disturbance of the channel and associated riparian-wetland plant communities. Riparian areas adapt to changes through the interaction of soil/landform, vegetation, and water. With the exception of sites that lack the vegetative potential, healthy riparian-wetland areas are typically characterized by vigorous and diverse plant communities that have the root structure and mass necessary to resist the erosive forces of water and sediments, or that provide for the recruitment of large wood to the stream channel to accomplish the same thing. If a riparian-wetland area is lacking in these critical attributes it will not be resilient to normal variations in water and sediment loads. Similarly, if larger watershed processes are substantially altered through either human activities or stochastic (unpredictable) events, riparian-wetland areas will experience degradation.

Riparian areas and wetlands that are in proper functioning condition have adequate vegetation, landform, or large woody debris present to dissipate energies associated with high water flows, wind action, wave action, and overland flow from adjacent sites. These areas serve to reduce erosion; filter sediment;

improve water quality; aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize stream banks, islands, and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat, water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity.

In recognition of the importance of riparian-wetland areas, as well as that of proper functioning condition as a base for supporting the health of these areas, the Director of the BLM in 1991 established a goal "to achieve proper functioning conditions" on all riparian-wetland areas on lands administered by the BLM (BLM 1991). Additional guidance is found in the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a), considered to be the most current primary guidance for ecosystem management that serves to meet the intent of the Federal Land Policy and Management Act (43 USC § 1701 et seq.) (FLPMA) and other relevant BLM policy concerning the management of vegetation, wildlife habitats, special status species, watersheds, and water quality. The BLM promotes healthy sustainable rangeland, woodland, and forest ecosystems in addition to accelerated restoration and improvement of public lands, as directed by the rangeland health standards (43 CFR 4180).

Assessments of proper functioning condition for riparian-wetland areas include Prichard 1998 categorizing a site into the following functional categories: proper functioning condition, functional at-risk, or nonfunctional (refer to Section 3.1.3, Water). A site is considered to be in proper functioning condition when adequate vegetation, landform, and large woody debris are present to dissipate stream energy, filter sediment, improve water retention and groundwater recharge, develop root masses to stabilize stream banks, develop diverse habitat characteristics for fish and wildlife, and support greater biodiversity (Prichard 1998). Functional at-risk sites are susceptible to degradation, and nonfunctional sites do not provide adequate vegetation, landform, or large woody debris to dissipate stream energy; therefore, they do not provide functions such as improving water quality and groundwater recharge (Prichard 1998).

It is important to understand that managing toward proper functioning condition as a minimum goal is not intended as a sole replacement for inventory or monitoring protocols designed to yield detailed information on the "biology" of the plants or animals dependent on the riparian-wetland ecosystem. Proper functioning condition is intended to provide information on whether a riparian-wetland area is functioning in a manner that will allow the maintenance or recovery of desired values (e.g., fish habitats, neotropical birds, forage, etc.). Thus, riparian areas and wetlands must, at a minimum, be properly functioning before the system has the dynamic stability to support the development of features necessary to produce the values desired by society. Depending on the blend of resource values and associated conditions established by a collaborative planning process such as proper functioning condition, other assessments will be required to ensure that these "higher" values are achieved once proper functioning condition has been attained.

Within the planning area, proper functioning condition assessments were completed between 1994 to 2003 on 404 miles of riparian areas associated with flowing water (e.g., streams and rivers) and 339 acres of riparian areas associated with standing water (e.g., lakes, reservoirs, and ponds) (see Table 3-17). Of the stream miles categorized as functional at-risk, 18 percent show an upward trend, no trend was apparent for 37 percent, and 7 percent show a downward trend. The monitoring of these areas is an ongoing process; therefore, the classification in Table 3-17 may not fully represent current conditions.

The proper functioning condition of riparian areas and wetlands is important to other programs and uses within the planning area, including mineral extraction; fire and fuels management; fish, wildlife, and special status species habitats; heritage resources; livestock grazing; recreation; special designations; and socioeconomic resources. For example, specific management guidelines pertaining to other resource

programs include habitat-improvement projects, restrictions on or prohibitions of certain activities near riparian and wetland areas, monitoring range conditions, stream improvement and use of areas by wildlife, control of INNS, and recreation guidelines. Standard 20012 of the *Standards for Healthy Rangeland and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) is related to riparian and wetland areas and provides a goal for all riparian and wetland areas grazed by livestock: "Riparian and wetland vegetation has structural, age, and species diversity characteristics of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge."

Table 3-17. Riparian and Wetland Area Assessment of Proper Functioning Condition on Public Surface within the Kemmerer Planning Area

Riparian/Wetland Type	Total Area Evaluated	Proper Functioning Condition		Functional At-Risk		Non-Functional	
		Area	Percent	Area	Percent	Area	Percent
Streams/Rivers[1]	404 miles	129 miles	32	250 miles	62	25 miles	6
Lakes, Reservoirs, Ponds	339 acres	289 acres	85	40 acres	12	10 acres	3

Source: BLM 2003a

[1]Perennial streams and rivers are measured in valley length rather than channel length.

Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow. Clary and Kinney (2000) indicate that the damage to riparian habitats as a result of bank alterations is greater than or equal to the damage caused by changes in vegetation biomass. See the Fish and Wildlife Resources – Fish section of this document for additional discussion regarding riparian vegetation, aquatic habitats, and existing conditions.

The Kemmerer Field Office focuses management on the entire watershed to improve water quality within riparian zones to benefit all users. The BLM's goal for riparian and wetland areas is to maintain, rehabilitate, and improve riparian ecosystems to achieve maximum long-term benefits. Management challenges for riparian communities include balancing the sometimes conflicting land uses while managing for proper functioning condition and water quality and controlling the spread of INNS. For example, some riparian or wetland areas are located on public lands in most of the larger grazing allotments in the planning area; however, these areas usually make up only a small percentage of the total riparian acreage and are almost always intermingled with private and (or) state lands. Riparian and wetland areas are often the primary, and sometimes the only, watering place for livestock. Consequently, grazing animals, including livestock and wildlife, tend to congregate in these areas, especially during the hot summer season. As a result, the condition of riparian areas is one reason some allotments have not met Standard 20012 of the rangeland health standards. This and other management challenges for riparian and wetland communities are addressed through management actions incorporated in the alternatives for biological resources and other resource programs, discussed in more detail in Chapter 2. As management plans for grazing allotments are developed, desired future conditions for each individual riparian and wetland area are included.

3.4.4 Fish and Wildlife Resources – Fish

The Kemmerer Field Office is responsible for managing fisheries habitats, while management of fish species is overseen by state and federal wildlife management agencies. The WGFD manages resident fish populations. Fisheries habitats include perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Three regional watersheds (3rd -order) providing fisheries habitats within the planning area are described under surface water quality in the Water section of this document and include the Green, Bear, and Snake rivers (Map 7). Within these drainages and their

tributaries, aquatic habitats vary by vegetation types, water quality and quantity, land use, and landscape setting.

Using valley length as the measure, approximately 403 miles of streams exist in the planning area. Using stream meander as the measure, approximately 509 miles of streams exist in the planning area. Base flows of the perennial streams vary from less than 1 cubic feet per second (cfs) to more than 800 cfs in the Green River. Of the 509 miles of streams in the planning area, approximately 139 miles are suitable for maintaining a fishery with the rest unsuitable at this time due to things such as very small intermittent flows, high water temperatures, and generally lacking habitat.

Fisheries habitats conditions are closely allied with the ecological conditions of riparian plant communities. Riparian vegetation occurs along drainages and serves to moderate water temperatures, control erosion by adding structure and stability to stream banks, provide in-stream habitats for fish, and provide organic material and nutrients to aquatic macroinvertebrates. Vegetation within the floodplain of drainages also serves to dissipate stream energy, store water for later release and provide areas for groundwater infiltration and rearing areas for juvenile fish. In addition to physical habitat features such as vegetation, water quality also influences aquatic habitats. Specifically, water temperature, turbidity, and dissolved oxygen determine the quantity and quality of aquatic habitats usable by various fish species. Other factors influencing aquatic habitats in the planning area include adjacent land use and the location of such habitats relative to natural landscape features. Approximately 31 percent of streams in the planning area are in proper functioning condition (BLM 2003a). Of the 139 miles containing a fishery, approximately 38 miles of streams are in proper functioning condition (BLM 2003a). Riparian and wetland habitat conditions within the planning area are further described in the Vegetation – Riparian and Wetland Communities section in this Chapter. Information on surface water bodies, water quality, and water quantity is provided in the Water section of this document. The BLM uses several types of management plans to focus management of site-specific fisheries and aquatic habitats in the planning area, including the Thomas Fork Aquatic Habitat Management Plan (HMP), three Conservation Agreements and Strategies (for Colorado River cutthroat trout, Bonneville cutthroat trout, and '3-species'), WGFD basin management plans, and three Cooperative Resource Management Plans (CRMP): Willow Creek CRMP, Smithsfork CRMP, and Cumberland CRMP. The Thomas Fork Aquatic HMP focuses on the Bear River (Bonneville) cutthroat trout, while the Willow Creek and Cumberland CRMPs focus on the Colorado River cutthroat trout, the Bonneville cutthroat trout, and the recovery of riparian areas in the Cumberland-Uinta allotment, respectively.

Public lands within the planning area provide habitats for 30 species of fish. These species have adapted to a variety of stream habitats, from the cold rapid waters of mountainous areas to the slow turbid waters of the high desert. The planning area supports seven BLM-sensitive fish species and four federally endangered fish species occurring downstream of the planning area and may be impacted by activities within the planning area (see the Special Status Species – Fish section of this document).

Historically, agriculture, vegetation management, fire management, development, OHV use, and recreation also have influenced fisheries habitats in the planning area. Another factor impacting fisheries habitats and conditions is water quality, which is regulated by the Wyoming DEQ. Historic and current water withdrawals for irrigation and other beneficial uses seasonally restrict the amount and distribution of aquatic habitats available for fisheries; however, water use in the planning area is regulated by the Wyoming State Engineer's Office. Although irrigation and other types of reservoirs can contribute to water depletion, they also trap sediment, which can degrade aquatic habitats, thereby reducing the sediment load downstream.

In addition to water depletion from historic activities (e.g., irrigation diversions), activities that result in soil compaction or erosion; increased sedimentation of streams; removal and degradation of riparian vegetation; changes in water temperature, velocity, volume, or timing of flows; and spread of INNS in riparian corridors have altered aquatic habitats in the planning area. For example, in some riparian areas,

historic livestock grazing contributed to aquatic habitat degradation through accelerated loss of streamside vegetation, compaction of soil, and increased stream bank erosion and silt deposition. To address these historic issues and the health, productivity, and sustainability of BLM-administered land in Wyoming, the BLM currently employs standards and guidelines for managing public rangelands toward the following fundamentals (BLM 1998a):

- Watersheds are functioning properly
- Water, nutrients, and energy are cycling properly
- Water quality meets state standards
- Habitats for special status species are protected.

Historic vegetation removal impacting aquatic habitats primarily occurred through vegetation treatment, fire, improper livestock grazing, and development, and involved erosion and sedimentation. The development of private lands within the planning area also contributed to effluent discharge, stream channelization, stream diversions and dams for reservoirs and powerplants, and changes in water temperature and water quality.

In addition to the historic activities described above, sport fish stocking occurs in designated multiple-use reservoirs in the planning area suitable for fisheries. Introductions of other game fish to Wyoming have occurred as early as 1880. The common carp, introduced in the 1880s as a food source, can be a nuisance in some situations, but has not infiltrated the waters in the planning area to any great degree. Common carp are known to occur in the lower Hams Fork River, Green River, and possibly the Blacks Fork River. Introducing game fish has had positive economic impacts for the state through recreational fishing; however, in some instances, there have been adverse impacts to native cutthroat populations through competition (space and forage), predation, and hybridization.

Management challenges identified for fish in the planning area are based, in part, on historic activities and habitat conditions and trends. Management challenges include flow management and sediment entrainment; activities contributing to reductions in streamside vegetation; management of produced water disposal; stream road crossings; maintaining proper functioning condition as a minimum condition for lotic and lentic riparian habitats; improving floodplain connectivity; developing water sources and acquisition of water rights to benefit fisheries; public access to fisheries; herbivory and physical trampling of riparian vegetation and soil compaction by herbivores; vegetation management, including INNS; fragmented land ownership; and water quality. Future activity plans may be identified to address these habitat challenges. Management actions for fish generally address surface-disturbing activities, barriers to fish passage, and habitat restoration, improvement, and conservation.

3.4.5 Fish and Wildlife Resources – Wildlife

Wildlife species throughout this document have been grouped according to Wyoming Statutory Wildlife Categories to facilitate the discussion regarding these species. The remainder of this section includes a description of the existing conditions and management challenges of habitat types and statutory wildlife groups found in the planning area. Management actions are incorporated in the alternatives and described in more detail in Chapter 2. For the purpose of this discussion, the terms *habitat* and *vegetative types* are used interchangeably.

Wildlife and Habitats in the Kemmerer Planning Area

The planning area is within the ecoregions of the Southern Rocky Mountain and the Intermountain Semidesert provinces (Bailey 1995). The convergence of these zones results in a diversity of vegetative types, as listed in Table 3-16 and described in more detail in the Vegetation sections in this Chapter. Following is a brief description of wildlife associated with the vegetative types as identified in Table 3-16.

The diversity of habitats and landscapes within the planning area cumulatively provide important areas for meeting all life requirements including breeding, foraging, migration, and winter range. The habitats and wildlife within the planning area are representative of northern Great Basin flora and fauna. Vegetation zones in the planning area are mostly the foothills scrub zone dominated by sagebrush, with timbered mountain slopes, some desert and basin zone, river bottoms, and limited alpine zones. These provide a broad range of diverse habitat types supporting the assemblages of species that live within the planning area.

Sagebrush, conifer forest, and desert shrubs vegetative types dominate the planning area (see Table 3-16). Sagebrush covers 2,095,198 acres of the planning area, of which 1,049,350 acres is BLM-administered surface land. The open grassland, sagebrush, and shrubland vegetative types are home to many raptor species, such as the Swainson's hawk, northern harrier, and prairie falcon. Raptors are attracted to the abundant prey, including upland game birds, small game, and numerous rodent species. More than 350 species of flora and fauna depend on the sagebrush vegetative type for all or part of their existence (Connelly et al. 2004). Sagebrush provides crucial winter range for big game and is essential for greater sage-grouse and other sagebrush obligates, such as the Brewer's sparrow, sage sparrow, and sage thrasher (Cerovski et al. 2001). Many other species utilize the sagebrush vegetative type, including a number of reptiles and invertebrates.

Although only representing approximately 3 percent of the planning area, riparian and wetland habitats provide important areas for wildlife use and avifauna nesting. Riparian vegetation often provides a corridor for wildlife migration and travel. Riparian habitats occur primarily in association with the major tributaries and main stems of Thomas Fork, Smiths Fork, Hams Fork, and Blacks Fork; Fontenelle, Raymond, Coal, and Rock creeks; and the Green and Bear rivers. Usually, a high degree of plant diversity occurs along the riparian corridors, exhibiting variable density and composition of plants that leads to diversity of openness and ground cover. In later stages of development, riparian communities can support cottonwood-willow communities that provide important habitats for furbearers, raptors, and game species.

Water sources are important to the location and survival of plants and animals within the planning area. Seeps and springs provide water and meadow habitats important during birthing and rearing for big game. Small, shallow lakes, reservoirs, ponds, and wetlands provide seasonal habitats for resident and migrant waterfowl and shorebirds, including American avocet, killdeer, long-billed curlew, Canada geese, mallard, and cinnamon teal. The small streams and spring outlets provide wet meadow and streamside riparian habitats used by a great variety of species.

The Bear River Divide, Rock Creek Ridge, and Sublette Range form a major ridgeline that runs north and south along the west side of the planning area. Commissary Ridge, Oyster Ridge, and the Hogsback form a ridgeline running north and south through the central portion of the planning area. These two major ridgelines are very important migratory pathways for migratory raptors and neotropical migrant birds.

Compared to sagebrush and grassland, forests and woodlands are less abundant in the planning area. Based on GAP vegetation data, approximately 21 percent of the planning area (822,814 acres) is forested, of which 114,314 acres are on lands administered by the BLM. Vegetative types included in the forest category include lodgepole pine with Douglas-fir and spruce-fir at higher elevations and moister sites. Woodlands include aspen and juniper. Forests and woodlands provide summer cover for big game and are prime habitats for American marten, blue grouse, and northern goshawks. Aspen represents an important component of biodiversity in the planning area. Aspen stands typically have a diverse understory component and, thus, provide abundant forage and cover for big game, particularly females with young. Aspen also supports an abundance and diversity of animal species, including birds such as

the blue grouse, red-naped sapsucker, and warbling vireo. Fire management, land development, climate, and ungulate grazing continue to affect the quantity and distribution of aspen in the planning area.

Large and small rim rock complexes in canyons and along ridge lines provide cliff and rock slope habitats that are primary nesting sites for swallows, rock doves, golden eagles, falcons, turkey vultures, and ferruginous and other species of hawks in the planning area. Rocks and canyons also provide denning sites for mountain lions and bobcats, and yearlong homes for many small mammals, including ground squirrels, woodrats, and rabbits. Abandoned cabins, mineshafts, and adits in the planning area provide potential and occupied habitat for numerous species of bats. Inventories of bats and other small mammals have not been completed within the planning area.

Historic activities from agriculture, development, fire and fuels management, OHV use, recreation, and transportation, have, in some areas, contributed to the degradation of wildlife habitats in the planning area. In other instances, historic activities have improved habitats or the ability to manage wildlife habitats. Examples of historic activities that have contributed to the degradation of wildlife habitats include livestock concentration areas (e.g., water sources), which have trampled and removed vegetation and compacted soil; utility and pipeline corridor installation, which has disturbed soil and provided opportunities for the spread of INNS; fire suppression, which has depleted or completely removed the natural fire regime with which habitats evolved; mineral developments and associated infrastructure development, which have disturbed soils for well pads, access roads, mining operations, and pipeline developments, thereby contributing to soil erosion and habitat fragmentation; improper OHV use, which has spread INNS and disturbed wildlife; recreation activities, which have disturbed wildlife; and road placements, which have contributed to habitat fragmentation in the planning area. The historic activities mentioned above have occurred to various degrees and primarily in isolated areas within the planning area. Consequently, current wildlife habitats in the planning area exhibit a range of existing conditions from habitats in proper functioning condition and habitats in something less than proper functioning condition to large, contiguous blocks of habitats to small, fragmented patches of habitats. Examples of historic activities that have improved wildlife habitats or improved the management of habitats in the planning area include prescribed fire to maintain or restore desirable vegetative types and restore a natural fire regime; livestock water developments as sediment traps and as water sources for native ungulates and other wildlife; use of OHVs to manage and monitor wildlife habitats in remote locations within the planning area; mining reclamation; and granting public access for hunting as a tool for big game management.

The BLM coordinates activities in the planning area with the WGFD and other federal agencies in managing fish, wildlife, upland game birds, and waterfowl to achieve and maintain sustainable population, including population dynamics and distributions. The WGFD and federal wildlife agencies are responsible for managing the populations, while the BLM, in cooperation with state and other federal agencies, is responsible for managing the habitats for the species. Through habitat management and restoration, the BLM intends to maintain and reestablish populations of native species that have historically used the range located within the planning area boundaries. Hunting is allowed throughout the planning area in accordance with the State of Wyoming regulations. In addition, the planning area currently is considered a “Bighorn Sheep Non-management Area” (Wyoming State-wide Bighorn/Domestic Sheep Interaction Working Group 2004).

BLM and WGFD guidance documents are available regarding BMPs and management of wildlife habitats (WGFD 2004a; BLM 2005d). The existing plan guides the BLM’s overall management of wildlife habitats within the planning area. Due to the relationship between wildlife habitats managed by BLM and wildlife species managed by the WGFD, a statewide agreement was established to facilitate cooperation between these agencies relative to wildlife (WGFD and BLM 1990). In accordance with the cooperative relationship between these agencies, the following description of priority wildlife species in the planning

area is organized by Wyoming statutory categories: big game, trophy game, furbearers, predatory animals, small game, game birds, migratory game birds, and nongame (raptors, neotropical migrants, mammals, and reptiles and amphibians).

Big Game

BLM-administered lands in the planning area provide habitat for a variety of big game species, including moose, mule deer, pronghorn, and Rocky Mountain elk. In addition, BLM-administered lands in the planning area provide the majority of crucial winter range for pronghorn, mule deer, and elk populations that occur between the Wyoming and Uinta mountain ranges. Winter is a crucial and stressful time for wild ungulates; therefore, crucial winter range for the most abundant big game species (pronghorn, mule deer, and elk) is often the focus of management and a criterion for analyzing the impacts of resources management on big game.

The planning area encompasses all or part of 18 big game populations or herd units (4 moose, 4 mule deer, 3 pronghorn, and 7 elk). Of these, 4 moose, 2 mule deer, 3 pronghorn, and 3 elk herd units include lands administered by the BLM. Established population size objectives guide management strategies for each big game herd unit. These objectives are established by the WGFD through a public interagency review and input process and are set at a biologically sustainable and socially acceptable level. Much of the information presented below on big game herd units was taken from the WGFD job completion reports (WGFD 2006a, 2006b).

Management challenges for big game species include poor habitat conditions, fire and fuels management, drought, increased development and urbanization, habitat fragmentation, OHV use, disease, and the impacts of livestock grazing on the frequency, quality, and composition of key forage species. The BLM and WGFD continually coordinate and evaluate actions affecting herd units and habitat conditions to determine appropriate management direction. Currently, chronic wasting disease has been discovered in western Colorado and eastern Utah, increasing concerns of the potential spread of this fatal brain disease into southwest Wyoming deer and elk herds. The impacts of these issues at the population level are not well understood.

Moose

Moose occupy a narrow range of habitats in the planning area. In the summer, moose utilize perennial streams, wetlands, and shrublands interspersed with forest cover. In the winter, moose browse willow, cottonwood, and aspen habitats. Winter populations of moose are larger than summer populations in the planning area. Moose generally summer in the Bridger-Teton and Wasatch National Forests and migrate to the lower elevations (e.g., stream bottoms) in the planning area in the winter to escape extreme snow depths. A limiting factor to all moose herds is the condition and trend of riparian communities (moose winter ranges), in the planning area, particularly willows and other palatable riparian shrubs.

Four moose herd units occur in the planning area and include the Lincoln, Sublette, Bear River Divide, and Uinta moose herd units. Moose herd units occupy approximately 3,930,927 acres in the planning area, of which approximately 1,423,960 acres are BLM-administered lands. The Lincoln Herd Unit post-season population has averaged approximately 1,514 moose between 2000 and 2004. The 2005 population estimate was 1,500, slightly below the herd population objective of 1,620 moose. The Sublette Herd Unit post-season population averaged approximately 3,997 moose between 2000 and 2004. The 2005 population estimate was 3,926, well below the herd unit objective of 5,500 moose. The Bear River Divide Herd Unit contains a small moose herd (an estimated 120 moose) that is scattered over a large expanse of nontypical open habitat. This area acts as an “over flow” area for adjacent larger populations of moose in the Uinta and Lincoln herd units. The Uinta Herd Unit post-season moose population averaged approximately 950 between 2000 and 2004. The 2005 population estimate was 925,

and the Herd Unit objective was 900. The Uinta moose herd is an interstate herd occupying the north slope of the Uinta Mountains of Wyoming and Utah. A majority of the moose winter in Wyoming and summer in Utah. Due to the interstate nature of this herd, no working models exist and estimates are not considered reliable. Some of the greatest threats to the moose in the Bear River Divide Herd Unit may be the loss of aspen due to plant succession and the lack of fire, and potential increases in energy development and winter recreation on winter ranges resulting in direct loss of habitats and disturbance, reducing the availability of the remaining habitats.

Approximately 283,358 acres of moose crucial winter range occur in the planning area, of which 89,472 acres are BLM-administered surface and 219,224 acres are federal mineral estate. In general, crucial winter range for moose is separate from deer or elk winter range in the planning area; however, two areas of overlap do occur. One area of overlap is located in the Rock Creek and Raymond Canyon areas north of Sage Junction and Cokeville; the second area of overlap occurs in the Chapman Butte and Blacks Fork area north of Cap White Ridge in the southern portion of the planning area.

Mule Deer

Mule deer occupy a wide range of habitats and almost all of the BLM-administered surface lands in the planning area constitute summer range for mule deer. Limited use occurs in the area bounded by State Highway 412, U.S. highways 189 and 30, and I-80. Population sustainability of mule deer at their objective level depends, in part, on habitat quality, quantity, and availability on public lands.

Two mule deer herd units (Wyoming Range and Uinta) occupy approximately 3,930,903 acres in the planning area, of which approximately 1,423,953 acres (36%) are BLM-administered surface lands. The Wyoming Range Herd Unit has shown a downward population trend from an estimated 37,639 mule deer post-season 2000, to an estimated 27,169 mule deer post-season 2005. The population is currently 46-percent below the population objective of 50,000. High mule deer mortality during the winters of 2001-02, 2003-04, and 2004-05, combined with drought conditions on summer and winter ranges resulting in poor fawn production, have kept this population depressed.

In the Uinta Herd Unit, mule deer populations generally are stable. The average post-season population estimate between 2000 and 2004 was 19,580 animals. The 2005 population estimate was 18,536, slightly below the herd unit objective of 20,000 mule deer. Because of herd mixing across the Utah-Wyoming state line and differing data collection methods between states, confidence in the accuracy of population estimates is low. Drought conditions and over-winter morality have been somewhat less severe in the Uinta Herd Unit than in the Wyoming Range Herd Unit. Fawn production data from 2003-2005, as well as fairly high buck ratios, point to good recruitment and an increasing population.

Mule deer generally move to winter range during November and remain there until April or May. There are approximately 467,348 acres of mule deer crucial winter range in the planning area, of which approximately 244,345 acres (52%) are BLM-administered surface lands. The largest winter range is more than 60-miles long and is associated with the western and southern portions of the Bear River Divide, Rock Creek Ridge, and the Sublette Range. Fontenelle and Slate creeks provide winter range in the northeastern portion of the planning area. Other areas of winter range include Muddy Creek and Blacks Fork near Piedmont and other smaller scattered areas in the planning area. Winter range is considered a limiting factor for mule deer in the region. Issues of concern within mule deer winter ranges include increased fencing, livestock grazing, competition for browse, declines in shrub community vigor, and unsound vegetation treatments, primarily on private lands. No winter feeding program occurs for mule deer in the planning area.

Livestock grazing occurs on the majority of mule deer summer and winter range. Cattle and mule deer have some dietary overlap, but generally, cattle grazing is compatible within mule deer habitats. However, heavy cattle stocking may convert shrub-grassland habitats into less palatable shrublands, making them less useful for mule deer. The diets of domestic sheep, however, have considerable overlap with the mule deer diet, which can affect mule deer forage.

Pronghorn

Pronghorn are associated with low, rolling terrain supporting open grassland and sagebrush communities. Population sustainability of pronghorn at their objective level depends, in part, on habitat quality, quantity, and availability on public lands.

Three pronghorn herd units occur in the planning area: the Sublette, Carter Lease, and Uinta Cedar Mountain herd units. Pronghorn herd units occupy approximately 3,313,346 acres in the planning area, of which approximately 1,419,938 acres (43%) are BLM-administered surface lands. Pronghorn post-season population estimates for the Sublette Herd Unit averaged 43,340 between 2000 and 2004. The 2005 estimate was 47,900 pronghorn, nearing the population objective of 48,000 pronghorn. Hunt area 93 is the only hunt area within the herd unit that extends onto BLM-administered lands. The population-objective level for hunt area 93 is 8,000 pronghorn. The post-season population estimate for this hunt area was 7,177 in 2005. Pronghorn population estimates for the Carter Lease Herd Unit averaged 9,023 between 2000 and 2004. The 2005 estimate was 9,207, far greater than the herd unit population objective of 6,000 pronghorn. Pronghorn population estimates for the Uinta Cedar Mountain Herd Unit averaged 7,860 between 2000 and 2004. The population appears to be increasing, with the 2005 estimate of 9,177 pronghorn, approaching the herd unit objective of 10,000.

Fence specifications exist that place the bottom wire high enough to allow pronghorn to pass without affecting the containment of livestock because pronghorn tend to crawl under fences rather than jump over them. The BLM constructs fences to these specifications. Snow may occasionally build up in the area between the bottom wire and the ground, where it may impede herd movement. Some fences, especially along highways, are not constructed to the specifications for pronghorn. When problems with herd mobility are identified, the fences are modified or gates on these fences are opened.

Livestock grazing occurs on the majority of the pronghorn summer range. Cattle and pronghorn generally have very little dietary overlap and, therefore, some cattle grazing is compatible with pronghorn habitats. Cattle can directly compete with pronghorn for the same vegetative resources when their ranges overlap in shrub communities (e.g., Gardner's saltbush, winterfat, and bitterbrush are all palatable to both), and when cattle grazing affects forb species availability and composition on overlapping summer ranges. Also, Bleich et al. (2005) outlined some indirect adverse impacts from cattle grazing, including (1) reduction in the vigor of plants and their quantity and quality, (2) elimination or reduction in a plant's reproductive capacity, (3) reduction or elimination of locally important cover types and replacement with less favorable types or communities, and (4) alteration of composition of plant communities due to season of use, which can consume favorable plants and increase the growth of undesirable plants or weeds. The diets of domestic sheep, however, have considerable overlap with the pronghorn diet and, therefore, sheep can out-compete pronghorn for forage (BLM 2003a).

Approximately 466,368 acres of pronghorn crucial winter range occur in the planning area, of which approximately 224,472 acres are BLM-administered surface and 294,302 acres are federal mineral estate. Major winter range areas are associated with lower Fontenelle and Slate creeks and the Green River. The largest winter range area is associated with lower Hams Fork, Blacks Fork, and Muddy Creek. Smaller winter range areas are south of Interstate 80, west of Sage Junction and in the Abbot Creek along State

Highway 189. The availability of browse, especially sagebrush, appears to be the limiting factor for pronghorn winter range.

Rocky Mountain Elk

Elk diets consist mostly of grasses and forbs, with grasses being the dominant forage in spring and forbs being the dominant forage in summer months (Clark and Stromberg 1987). Shrubs are consumed year round, but are especially important on the winter range when forbs and grasses are less accessible. BLM-administered lands provide less cover for elk and have a higher degree of road access than the adjacent USFS lands. Almost all the BLM-administered lands in the planning area could be considered summer range for elk. However, the elk are migratory, and most migrate to the Bridger-Teton or Wasatch National Forests in the summer. Some elk remain on higher elevation BLM-administered lands throughout the summer in areas where cover is adequate and disturbing activities are minimal. Only those areas north of Kemmerer, south of Mountain View, and along the northern portion of the Bear River Divide are considered occupied summer range. Nonetheless, they are important because the long stringers (continuous strands) of cover along ridges allow elk access to forage and winter range. High country areas along the forest boundary (aspen-conifer associations) support considerable spring and fall and some summer elk use. These areas also are used for calving. Winter range appears to be the main limiting factor for elk in the planning area; however, poor forage conditions from drought conditions are contributing factors to low calf production and survival.

There are approximately 461,061 acres of elk crucial winter range in the planning area, of which approximately 272,480 acres (59%) are BLM-administered surface lands. Elk crucial winter range is concentrated in five major locations, mostly in the northern portion of the resource area. These areas strongly overlap with mule deer wintering areas, but also include areas with deeper snow. The two largest winter range areas are to the northeast and northwest of Kemmerer in the north-central portion of the planning area, associated with the western side and southern aspects of Rock Creek Ridge, and an area associated with Fontenelle and Slate creeks. There are many smaller areas scattered from Lake Viva Naughton and the Sublette Range north. Two moderate-sized winter ranges are located south of I-80, one in the vicinity of Hickey Mountain and the other southwest of Fort Bridger. Use of these two southern winter ranges is heavily influenced by weather conditions. In mild winters, many of the animals never completely move out of summer range areas in Utah.

Seven elk herd units occur in the planning area, of which three—the Afton, West Green River, and Uinta herd units—occupy BLM-administered surface lands. The Afton Herd Unit elk population has generally been stable for the last few years. The post-season population estimate averaged 2,451 elk between 2000 and 2004. The 2005 population estimate was 2,330, slightly above the herd unit population objective of 2,200. Some elk from Idaho herd units winter in Wyoming. Mixing of elk between Wyoming and Idaho and variability in the timing of movement complicates an accurate determination of population numbers. The principle issues concerning elk management in the Afton Herd Unit are related to damage to private landowner forage and numbers of animals on the two winter feed grounds in this unit. These two feed grounds, the Alpine feed ground and the Forest Park feed ground, occur in the planning area. The purpose of the Alpine feed ground is to alleviate private property damage and motor vehicle collisions, while the purpose of the Forest Park feed ground is to prevent starvation of animals. Neither feed ground is on BLM-administered lands, but there have been instances of emergency feeding, such as during the severe winter of 1996 and 1997.

The West Green River Herd Unit population estimate averaged 4,423 between 2000 and 2004. The 2005 estimate was 4,439 elk, substantially greater than the herd unit population objective of 3,100 elk. Drought conditions impact elk through reduced forage production and poor body conditions, which could lower calf production and survival. Elk numbers observed on trend counts have remained stable on these winter

ranges. Continued use of depredation hunts, kill permits, and other tactics to reduce damage to private lands are anticipated. The greatest long-term threat to this elk herd may be from projected oil and gas development on winter and spring ranges resulting in direct loss of habitats and direct disturbance, which reduces the availability of the remaining habitats.

The Uinta Herd Unit management objective is for 600 wintering elk. The population is thought to have been at or near objective since 2000. However, confidence in the population estimate is low because of herd mixing across the Utah-Wyoming state line and differing data collection methods between states. Wintering numbers and harvest levels highly depend on weather conditions affecting timing and extent of elk seasonal movements. Drought conditions do not seem to have affected elk populations as much as mule deer or pronghorn.

Livestock grazing occurs on the majority of the elk summer and winter range. Cattle and elk have considerable dietary overlap; therefore, cattle grazing can be incompatible with elk habitats, especially on winter range areas. The diets of domestic sheep, however, have less overlap with the elk diet, so sheep are less likely to compete with elk for forage.

Trophy Game

Trophy game found on BLM-administered land in the planning area includes black bear and mountain lion. Limited black bear populations occur in aspen-conifer areas in higher elevations of the northern portion of the planning area. The goal within the planning area is to maintain a healthy bear population capable of providing a broad range of recreational opportunities (including hunting and viewing in existing occupied habitats) while considering public safety, economic concerns, and other wildlife species. Due to a bear's secretive nature, population estimates are difficult to obtain and population objectives are not established. The BLM and WGFD utilize management guidelines established by the WGFD's *Black Bear Management Plan* (WGFD 1994) to help direct management activities on BLM-administered land.

Mountain lion populations generally occur in the northern, northwestern, and southern edges of the planning area at higher elevations. The seasonal range of mountain lions generally follows that of their main prey, mule deer. The planning area encompasses portions of two WGFD lion management units (southwest and west) and three lion hunt units. Management goals generally focus on sustaining mountain lion populations, maintaining prey (mule deer) populations, and providing recreation and hunting opportunities, while considering human safety, economic concerns, and the needs of other wildlife species. The BLM and WGFD utilize management guidelines established by the WGFD's *Mountain Lion Management Plan* (WGFD 2006c) to help direct management activities on BLM-administered land.

Furbearing Animals

Furbearing animals in the planning area include badger, beaver, bobcat, mink, weasel, muskrat, and marten. Badger and bobcat are habitat generalists and can be found throughout the planning area, although bobcat do not occupy high mountain areas. Beaver, mink, and muskrat are common in the waters and riparian areas throughout the planning area. Marten occur in the forested regions of the mountains along the north and south portions of the planning area. Short-tailed weasels are found in coniferous forest, riparian shrub and meadow habitats, while long-tailed weasel are typically found in rock outcrops near water in desert shrub, grassland, and riparian shrub habitats (Cerovski et al. 2004). No management challenges have been identified for these species in the planning area.

Predatory Animals

According to Wyoming statute, predatory animals include coyote, jackrabbit, porcupine, stray cat, gray wolf, red fox, raccoon, and skunk (striped and spotted). From the standpoint of BLM management, most

of the efforts and attention are focused on coyote, red fox, and skunk animal damage-control activities. The BLM does not conduct any habitat-management activities for predatory animals.

Predatory animal damage-control activities on public lands are conducted by the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)-Wildlife Services in accordance with the national Memorandum of Understanding (MOU) and local action plans (BLM 1997b; BLM 1995b; BLM 2000a). These activities are conducted in response to requests from individuals, organizations, and agencies experiencing damage caused by wildlife. Animal damage-control activities primarily include mechanical (trapping, shooting, and denning), chemical (poison), and nonlethal methods (noise devices, aversive conditioning, etc.). Through the Animal Damage Management Board, the State of Wyoming also conducts animal damage-control activities, particularly those actions involving rabies and other diseases. The management challenges of animal damage-control activities are to conduct a program that responds to predation problems and remains socially acceptable and safe in accordance with applicable laws and regulations.

Small Game

Three mammal species can be harvested as small game in the planning area: cottontail rabbit, snowshoe hare, and red squirrel. Cottontail rabbits are habitat generalists, occupying brushy, rocky areas, dense sagebrush, streamside thickets, and brushy forest edges throughout the planning area. Snowshoe hare primarily utilize conifer forest and aspen communities in higher elevation areas. Red squirrels occur mainly in coniferous and mixed forests, but could also occupy deciduous woodlots, hedgerows, and second-growth areas. Populations of all small game species tend to be cyclic in nature. No assessments of habitat condition, estimates of population size, mortality or natality rates, or hunter effort are known for any of these species. Due to the wide distribution of small game species throughout Wyoming, no management challenges are identified in the planning area. No specific management objectives exist for these species in the planning area.

Game Birds

Game bird management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Upland Game Bird Habitat Management Plan* (BLM 1992a). All game bird species in Wyoming are managed for recreational use (e.g., hunting, bird watching, etc.).

Game birds include greater sage-grouse, ruffed grouse, blue grouse, chuckar, and Hungarian partridge. Greater sage-grouse are discussed in the Special Status Species - Wildlife section of this chapter. Ruffed grouse generally are associated with brushy riparian habitats within the conifer zone and blue grouse generally are associated with upland conifer habitats. These habitat types occur in the northern and southern sections of the planning area. No specific management areas are designated for these species. In general, increased water availability and improvement to riparian habitats in the conifer zone are current management objectives for these species.

Migratory Game Birds

Migratory game birds in the planning area include waterfowl and the mourning dove. At least 24 species of waterfowl are known to occur in the planning area. Most species are migratory, but some nest in the planning area. Most water bodies in the planning area provide staging and migration stopover habitat for waterfowl. Aquatic resources are scattered throughout the planning area. The main areas used by waterfowl include the Bear River and Green River and their tributaries and adjacent wetlands. The Wheat Creek Meadows Wildlife Habitat Area north of Kemmerer is managed to enhance waterfowl and other wetland species breeding, nesting, and rearing habitats. In Wyoming, mourning doves are typically associated with river-bottom lands and agricultural areas that provide necessary food, water, roosting, and

breeding areas. Mourning doves are common throughout the planning area and are associated with weedy forb species. Livestock and wildlife water developments increase the potential suitable habitats in the planning area for mourning doves.

Nongame

Existing conditions for four categories of nongame wildlife (raptors, neotropical migrants, mammals, and reptiles and amphibians) are described briefly below. Raptors and neotropical migrants are afforded protection under the Migratory Bird Treaty Act. Additional detail about nongame wildlife occurring within the planning area can be found in the WGFD's *Atlas of Birds, Mammals, Amphibians and Reptiles in Wyoming* (Cerovski et al. 2004) and the *Comprehensive Wildlife Conservation Strategy* (WGFD 2005). In addition, the *Wyoming Partners in Flight's Wyoming Bird Conservation Plan* identifies priority bird species and habitats, as well as population and habitat objectives for birds (Nicholoff 2003).

Raptors

Raptors include eagles, hawks, owls, falcons, and vultures. The planning area provides seasonal and yearlong habitat for a multitude of raptor species. Raptor utilization for specific and regionwide areas varies greatly year-to-year and season-to-season depending on prey availability, habitat quality, level of raptor populations, and other factors. Common breeding raptors in the planning area include Swainson's hawk, ferruginous hawk, red-tailed hawk, northern harrier, golden eagle, prairie falcon, American kestrel, and great-horned owl. Of these raptors, golden eagle and great-horned owl are yearlong residents, and smaller winter populations of red-tailed hawk and northern harrier also occur within the planning area. Ferruginous hawk is discussed in more detail in the Special Status Species-Wildlife section of this Chapter. Other raptor species adapted for open areas found during various times of the year include rough-legged hawk, a winter resident; snowy owl, a rare winter visitor; long-eared owl, a denizen of open and forested areas; and short-eared owl. Ospreys are common summer residents in the planning area along the major river and stream systems. Forest raptors occurring in the planning area include sharp-shinned hawk, Cooper's hawk, northern goshawk, and northern saw-whet owl.

Management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Raptor Habitat Management Plan* (BLM 1992b). Management procedures and activities for raptors have been identified by the USFWS management guidelines (USFWS 2002) and Avian Protection Plan guidelines (APLIC and USFWS 2005). The *Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0* identifies habitat requirements and threats for raptor species (Nicholoff 2003). Currently, approximately 210 raptor nests are documented in the planning area, of which 140 raptor nests are on BLM-administered surface land. Not all of these nests are occupied, however. The BLM and the WGFD regularly survey and monitor raptor nest activity.

Management challenges for raptors generally are directed at activities around nesting habitats, concentration sites (e.g., winter roosts), and foraging areas. Management of powerlines and contaminants for raptor conservation are ongoing issues in the planning area.

Neotropical Migrants

For the purposes of this RMP, neotropical migrants include birds that breed in the United States and Canada and winter in Latin America (Nicholoff 2003). The terms "neotropical migrants" and "nongame birds" are used interchangeably for this discussion. Neotropical migrant management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Nongame Migratory Bird Conservation Plan* (BLM 1992c). The *Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0* provides habitat requirements for neotropical migrant species and identifies their threats (Nicholoff 2003).

Numerous nongame bird species are known or suspected to occur within the planning area, including waterbirds, shorebirds, marshbirds, and a range of songbirds, both residents and neotropical migrants. Many of these species breed in Wyoming, others rely on habitats within the state during migration, and a few species breed to the north and winter in Wyoming. Most songbirds in the planning area are those adapted for open areas. The vast sagebrush component of the planning area provides important habitats for major indicators of that type—sage thrasher, Brewer's sparrow, and sage sparrow. Forests, riparian areas, and water resources within the planning area also provide habitats for multitudes of other species. These species collectively utilize all of the vegetative types in the planning area.

Management challenges focus around maintaining or enhancing the presence of these species and the habitats upon which they depend. Management actions for neotropical migrants generally are directed at activities around nesting habitat and migration corridors. Ongoing conservation issues for neotropical migrants include managing hazards such as powerlines, communication towers, contaminants, and wind turbines.

Mammals

At least 43 species of nongame mammals are known or suspected to occur in the planning area, including 5 shrew species, 12 bat species, 9 squirrel family species, 2 gopher species, 14 mouse or rat species, and the porcupine. For a complete habitat description and distribution of nongame mammals, refer to the *Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming* (Cerovski et al. 2004). Most nongame mammals are widely distributed in the state, and although the population trends are unknown, they are believed to be stable. Population trend data and specific habitat requirement information are lacking for many of these species.

Management challenges currently focus on increasing the understanding of habitat requirements for these species and maintaining the presence of these species in occupied habitats. Ongoing conservation efforts for nongame mammals include reducing the spread of INNS into native habitats and managing hazards, such as contaminants and developments.

Reptiles and Amphibians

The climate and habitat types in the planning area restrict the diversity and abundance of reptiles and amphibians. In general, reptiles occurring in the planning area occupy a variety of habitats, including rock outcrops (lizards) and a variety of terrestrial vegetative types (snakes and lizards). Amphibians occurring in the planning area occupy aquatic habitats, including springs, wetlands, riparian corridors, or open water for the first phase of their life-cycles. Ten species of reptiles and amphibians are expected to occur in the planning area: tiger salamander, boreal toad, Great Basin spadefoot, boreal chorus frog, northern leopard frog, spotted frog, eastern short-horned lizard, northern sagebrush lizard, rubber boa, and wandering garter snake. No estimates of population size are known for any of these species. The boreal toad, Great Basin spadefoot, Northern leopard frog, and spotted frog are discussed in more detail in the Special Status Species – Wildlife section of this Chapter. Management challenges for reptiles and amphibians primarily include maintaining a variety of habitat types and components (e.g., rock outcrops) in proximity to provide for the requirements of these species.

3.4.6 Special Status Species – Plants

Management of special status species on public lands administered by the BLM is directed by a variety of laws, policies, and other requirements, as summarized in Chapter 1.

The USFWS provides regulatory oversight for all plant, fish, and wildlife species listed as threatened or endangered, proposed for listing, or are candidates for listing under the ESA. Management of federally listed species and the designation of critical habitats are overseen by the USFWS in accordance with the ESA. Formal consultation is required on any action a federal agency proposes that may adversely affect a

federally listed species or critical habitat. A conference is initiated when any action will result in jeopardy or adverse modification of critical habitats for proposed species. Informal consultation is required on any action a federal agency proposes that (1) may affect – not likely to adversely affect listed species or critical habitat or (2) may affect – may have beneficial, discountable or insignificant effects. Consultation is not required when it is determined that an action will have no effect on listed species or designated critical habitat. Special status species considered in this analysis include those species listed as threatened or endangered, those are proposed for listing, those that are candidates for listing, or those that are designated by the BLM State Director as sensitive.

Currently, four species of plants within Wyoming are listed as either endangered or threatened by the ESA, none of which is known to occur in the planning area, although potential habitats for one of these species does occur within the planning area. No plants are proposed or candidates for listing within Wyoming. No designated critical habitat exists in the planning area. Eight sensitive plant species, as designated by the BLM State Director, occur in the planning area.

The Wyoming Natural Diversity Database (WYNDD) maintains a list of Wyoming plant species of concern and plant species of potential concern and provides information on global and state abundance, legal status, and state distribution (Keinath et al. 2003). Species in Wyoming are considered to be of special concern if (1) the species is vulnerable to extinction at the global or state level due to inherent rarity, (2) the species has experienced a significant loss of habitat, or (3) the species is sensitive to human-caused mortality or habitat disturbances. The WYNDD tracks, studies, and documents these special status species and other species considered to be rare within the State of Wyoming. The species on this list are watched to determine their abundance and whether they need to be added to the BLM-sensitive species list. By continuing to identify and avoid actions that could result in adverse impacts to these species and their habitats, their populations can be maintained so they will not need to be listed by the BLM as sensitive in the future. The BLM Wyoming State Office conducts an annual review of its sensitive species list to make additions or deletions based on the most current information on species status. Currently, the Wyoming State Government does not list any plant species as sensitive.

The Kemmerer Field Office determines presence of special status plant species on a case-by-case basis. Restrictions in areas with known populations of special status plants are also determined on a case-by-case basis. The Kemmerer Field Office has the specific goals of contributing to the recovery of species currently listed under the ESA and to promoting the recovery and conservation of all special status plant species within the planning area (BLM 2003a).

Special status plant species that occur or have habitats available in the planning area are listed in Table 3-18 and described in this section. There are no known occurrences of federally listed plant species, although habitat for one of these species occurs within the planning area. Eight sensitive plant species and 17 plant species tracked as rare by WYNDD are documented as occurring within the planning area. Much of the information in the following species descriptions was taken from the *Summary of the Management Situation Analysis* (BLM 2003a) for the planning area.

Federally Listed Plant Species

Ute Ladies'-tresses. Ute ladies'-tresses, a federally listed threatened species, has not yet been identified in western Wyoming, although potential habitat for the species does exist. The Ute ladies'-tresses grows on moist sub-irrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams at elevations between 1,780 and 6,800 feet. Populations have been documented from alkaline sedge meadows, riverine floodplains, flooded alkaline meadows adjacent to ponderosa pine-Douglas-fir woodlands, sagebrush steppe, and streamside floodplains. The Ute ladies'-tresses is well adapted to disturbances from stream movement and is tolerant of other disturbances, such as light grazing, that are common to grassland riparian habitats and reduce competition between the orchid and other plants (USFWS 1995). Populations are known from along the

base of the eastern side of the Rocky Mountains in portions of Wyoming, Montana, and Colorado. Populations are also known from the upper Colorado River basin, especially in the Uinta basin; areas along the Wasatch Front and westward in the eastern Great basin; in north-central and western Utah; extreme eastern Nevada; and in Nebraska and Washington. The populations closest to the planning area are found in the Brown's Park area along the Green River in northeast Utah and along the Snake River in eastern Idaho. The riparian and wetland habitats for Ute ladies'-tresses have been heavily impacted by urban development, heavy grazing, stream channelization, water diversions, and watershed and stream alterations that reduce the natural dynamics of stream systems, recreation, and invasion of habitats by exotic plant species (USFWS 1995). The potential habitats within the planning area include riparian and wetland communities at elevations below 7,000 feet.

To gather as much information about this species as possible, and to comply with the provisions of the ESA and BLM national policy, the Kemmerer Field Office requires surveys of all suitable areas that could provide habitat for this species prior to engaging in surface-disturbing activities. Should Ute ladies'-tresses be found, all disruptive activities would be halted until protective measures developed in coordination with the USFWS could be implemented. Mandatory surveys and avoidance would help to prevent adverse impacts to this species within the planning area.

BLM Sensitive Plant Species

Trelease's Racemose Milkvetch. Trelease's racemose milkvetch is a regionally endemic Wyoming BLM-sensitive species, as well as a Natural Heritage Network globally secure and Wyoming State and trinomially (taxonomic ranking identified below that of species) imperiled species. It grows on barren hills and washes, although little else is known about this species. The Wyoming Rare Plant Technical Committee is currently compiling information on the Trelease's racemose milkvetch. Populations of Trelease's racemose milkvetch are known to occur in Sublette and Uinta counties. Two occurrences are known from the southern portion of the planning area. At present, threats to the species are unknown.

Entire-leaved Peppergrass. Entire-leaved peppergrass is a Wyoming sensitive species, as well as a Natural Heritage Network global, state, and trinomially imperiled species. It is a perennial forb found on desert hills, sparsely vegetated and seasonally wet clay flats, and moist alkaline meadows at elevations between 6,200 to 6,770 feet in Lincoln and Uinta counties. Entire-leaved peppergrass is a regionally endemic species of northeastern Utah and southwestern Wyoming found within Fossil Butte National Monument and in one location within the planning area. Threats to the species include human development, which has caused the loss of many of Utah's entire-leaved peppergrass populations.

Large-fruited Bladderpod. Large-fruited bladderpod is a Wyoming BLM sensitive species, as well as a Natural Heritage Network global and state-imperiled perennial species. It grows in open Gardner's saltbush and squirreltail communities on barren clay hills and flats. Usually, populations are found on slopes of less than 15 percent on low hills, knolls, or colluvial fans at elevations of 6,800 to 7,700 feet. Soils are usually fine to textured barren clays and shales. The large-fruited bladderpod is endemic to an area less than 25 square miles in size on the western rim of the Great Divide basin and in the Green River basin near Opal and Ross Butte, Wyoming. Disturbance from oil and gas mining and exploration is a threat to the species. OHV use and wild horse activity are also possible threats. Management entities with known populations of large-fruited bladderpod include the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, one occurrence of the large-fruited bladderpod is known south of Opal.

Western Bladderpod. Western bladderpod is a Wyoming BLM-sensitive species, as well as a Natural Heritage Network globally rare and state-imperiled perennial forb. It grows on dry, gravelly limestone ridges and slopes at elevations of 8,300 to 8,600 feet. It is a regional endemic of northeastern Utah, southeastern Idaho, and western Wyoming. In Wyoming, it is known only from the Snake River Range

and Overthrust Belt in Lincoln County. Current trends and threats are unknown for this species. One population is found on lands in the Targhee National Forest on land managed by the Bridger-Teton National Forest, and the other population is managed by the BLM in southwestern Lincoln County within the planning area.

Table 3-18. Special Status Plant Species Known to or Potentially Occurring in the Kemmerer Planning Area

Scientific Name	Common Name	Rank[1]
Federally Listed Plant Species		
Spiranthes diluvialis	Ute ladies'-tresses	federally threatened
BLM Sensitive Plant Species		
Astragalus racemosus var. *treleasei*	Trelease's racemose milkvetch	G5T2/S1
Lepidium integrifolium var. *integrifolium*	Entire-leaved peppergrass	G2T1/S1
Lesquerella macrocarpa	Large-fruited bladderpod	G2/S2
Lesquerella multiceps	Western bladderpod	G3/S1
Lesquerella prostrata	Prostrate bladderpod	G3/S1
Phlox pungens	Beaver-rim phlox	G2/S2
Physaria condensata	Tufted twinpod	G2/S2
Physaria dornii	Dorn's twinpod	G1/S1
WYNDD Plant Species of Concern		
Achnatherum swallenii	Swallen mountain ricegrass	G5/S2
Astragalus bisulcatus var. *haydenianus*	Hayden's milkvetch	G5T5/S2
Astragalus coltonii var. *moabensis*	Moab milkvetch	G5T3/S2
Astragalus lentiginosus var. *salinus*	Sodaville milkvetch	G5T5/S2
Atriplex falcata	Sickle saltbush	G5/S1
Chamaechaenactis scaposa	Fullstem	G5/S1-2
Downingia laeta	Great Basin downingia	G5/S1
Eriogonum divaricatum	Divergent wild buckwheat	G5/S1
Lathyrus lanszwertii var. *lanszwertii*	Nevada sweetpea	G5T5/S1
Lesquerella parvula	Narrow-leaved bladderpod	G5T3/S1
Opuntia polyacantha var. *juniperina*	Juniper prickly pear	G5T3/S1
Opuntia polyacantha var. *rufispina*	Rufous-spine prickly pear	G5T5/S2
Penstemon scariosus var. *garrettii*	Garrett's beardtongue	G5T3/S1
Phacelia glandulosa var. *deserta*	Desert glandular phacelia	G5T1-2/S1
Phlox albomarginata	White-margined phlox	G5/S1
Potentilla multisecta	Deep creek cinquefoil	G3-4/S1
Silene douglasii	Douglas' campion	G5/S1

Sources: BLM 2003a; Keinath et al. 2003

[1] The WYNDD utilizes a standardized ranking system developed by The Nature Conservancy's Natural Heritage Network to assess the global and statewide conservation status of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. Codes are as follows:

G Global rank: Rank refers to the rangewide status of a species.

T Trinomial rank: Rank refers to the rangewide status of a subspecies or variety.

S State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.

1 Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.

2 Imperiled because of rarity (often known from 6 to 20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.

3 Rare or local throughout its range or found locally in a restricted range (usually known from 21 to 100 occurrences).

4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.

5 Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.

6 Ute ladies'-tresses are not known to occur in the planning area; however, potential habitat does occur in the planning area.

BLM Bureau of Land Management

WYNDD Wyoming Natural Diversity Database

Prostrate Bladderpod. Prostrate bladderpod is a Wyoming BLM-sensitive species, as well as a Natural Heritage Network globally rare and state-imperiled perennial forb. It is a regional endemic found in central Idaho and southeastern Idaho and in southwestern Wyoming and northeastern Utah. In Wyoming, it occurs in the Overthrust Belt in Lincoln and Uinta counties. Prostrate bladderpod grows on slopes and rims of limey clays and soft sandstones with a fine gravel surface layer at elevations of 7,200 to 7,700 feet. Threats at the present time to this species are low because the plants grow on steep slopes; however, further oil and gas development and pipeline construction in the future may pose a threat. Prostrate bladderpod has five populations growing in the south and central portions of the planning area.

Beaver Rim Phlox. Beaver Rim phlox is a slightly prickly matted plant with large white flowers determined in 1988 to be endemic to Wyoming. Beaver rim phlox is classified as Wyoming BLM sensitive with a high conservation priority and is ranked by the Natural Heritage Network as a global and state-imperiled species. This species grows on dry desert hills on sparsely vegetated slopes with sandstone, siltstone, or limestone substrates at elevations of 6,000 to 7,400 feet. Populations of Beaver Rim phlox are known to occur in the Green River basin in Sublette and Lincoln counties and in southern Fremont County. The Green River basin populations differ morphologically from those in Fremont County by having short-stalked glandular hairs on the leaves, as well as narrower leaves. Beaver Rim phlox is known to occur in the eastern edge of the planning area. General threats to the Beaver Rim phlox include disturbance from oil and gas development, pipeline construction, and highway construction.

Tufted Twinpod. Tufted twinpod is a Wyoming BLM-sensitive perennial forb, as well as a with Natural Heritage Network global and state-imperiled species. Tufted twinpod is found on dry, rocky calcareous knolls and ridges, shaly hills, and clay banks. This species occurs in openings within sagebrush grassland at elevations of 6,700 to 7,400 feet in sparsely vegetated cushion plant communities. Tufted twinpod is an endemic to the southern Overthrust Belt and lower Green River basin in Lincoln, Sublette, and Uinta counties in southwest Wyoming. Tufted twinpod may be adaptable to disturbed sites and threats appear minimal. The species occurs on lands managed by Fossil Butte National Monument and the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, it is known in 12 locations.

Dorn's Twinpod. Dorn's twinpod is a BLM-sensitive species and a Natural Heritage Network global and state critically imperiled species. This species is a locally endemic perennial herb restricted to the southern Overthrust Belt in Lincoln and Uinta counties. Dorn's twinpod grows on clay-gravel or sandy-shale slopes with little plant cover at elevations of 6,500 to 7,600 feet. Threats include OHV use, road construction, and mineral exploration. Dorn's twinpod grows on BLM-administered land and on adjacent state and private land. Within the planning area, there are four main populations with 97 percent of the population occurring in a contiguous area comprising three of the populations within southwestern Lincoln County and one population within Uinta County.

WYNDD Sensitive Plant Species

Swallen Mountain-ricegrass. Swallen mountain-ricegrass is a perennial bunchgrass with BLM-sensitive status in the BLM Rock Springs planning area, occurring on sandy to gravely limey-clay soils covered with gravel. The Natural Heritage Network ranks the species as state-imperiled and globally secure, but possibly rare in parts of its range. Swallen mountain-ricegrass is found on rocky slopes, rims, and mesa summits, often associated with sagebrush grasslands at elevations of 6,500 to 7,900 feet. Swallen mountain-ricegrass is an endemic of east-central Idaho and western Wyoming. Wyoming populations are known only from the western Green River basin in Lincoln and Sublette counties. Populations may be threatened from oil and gas development and populations are known in lands managed by the BLM Kemmerer, Pinedale, and Rock Springs field offices, including one occurrence in the planning area.

Hayden's Milkvetch. Hayden's milkvetch is a WYNDD-sensitive perennial herb with globally and trinomially secure rankings, but also with state-imperiled Natural Heritage Network rankings. In

Wyoming, Hayden's milkvetch is known from the Washakie and Great Divide basins in Carbon, Fremont, and Sweetwater counties and the Overthrust Belt in Lincoln and Uinta counties. Hayden's milkvetch grows on clay or sandy soils on rims, upper slopes, and draws associated with sandstone outcrops or springs at elevations of 6,600 to 7,660 feet. Threats and trends have not been identified for this species. The populations are found on land managed by the BLM Kemmerer, Lander, Rawlins, and Rock Springs field offices. Within the planning area, it is known in one location in southern Lincoln County.

Moab Milkvetch. Moab milkvetch is a WYNDD-sensitive perennial herb with Natural Heritage Network rankings of globally secure, trinomially rare, and state-imperiled. Moab milkvetch grows on desert hills in Sweetwater and Uinta counties. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer and Rock Springs field offices. Within the planning area, Moab milkvetch is known in one location in southeastern Uinta County.

Sodaville Milkvetch. Sodaville milkvetch is a WYNDD-sensitive perennial forb with Natural Heritage Network rankings of globally and trinomially secure and state-imperiled. In Wyoming, sodaville milkvetch is restricted to the Overthrust Belt in Lincoln and Uinta counties. Sodaville milkvetch grows in big sagebrush communities on rocky clay slopes and ridges below rimrock at elevations of 6,540 to 6,800 feet. Threats to the species include OHV use and invasive species. Within the planning area, the plant is known in two locations in western Lincoln County.

Sickle Saltbush. Sickle saltbush is a WYNDD-sensitive shrub ranked by the Natural Heritage Network as critically imperiled in the State of Wyoming and globally secure. Sickle saltbush grows in sagebrush-dominated communities on desert hills, mesas, draws, and gravel benches with sandy to clayey soil. The known range of sickle saltbush includes southeastern Washington to northeastern California, east to Montana, Utah, and Nevada. In addition to Uinta County, Sublette and Sweetwater counties also contain known populations. Disturbance from mining exploration may impact some populations of sickle saltbush. Management entities with known populations include the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, the plant is known in one location in central Uinta County, which may have been eliminated during the construction of I-80.

Fullstem. Fullstem is a WYNDD-sensitive perennial forb with a Natural Heritage Network ranking of globally secure and a state ranking of imperiled to critically imperiled. Fullstem is a regional endemic of southeastern Wyoming and northeast Utah. In Wyoming, fullstem is known only from the southern Green River and Washakie basins in Sweetwater County. Fullstem occurs in cushion plant communities on sparsely vegetated calcareous clay barrens rims and benches or in dry washes on extremely fine clay shales at elevations of 6,350 to 7,400 feet. This species may be threatened by oil and gas development and associated construction. Within the planning area, it is found in one location in western Sweetwater County.

Great Basin Downingia. Great Basin downingia is a WYNDD-sensitive annual herb with a Natural Heritage Network rank of globally secure and a state rank of critically imperiled. This species is wide ranging, with occurrences in Wyoming known from the Laramie basin, Sweetwater River Plateau, and Overthrust Belt in Albany, Carbon, and Uinta counties. Great Basin downingia occurs in moist clay or sandy openings along ditch banks and reservoirs at elevations of 6,160 to 7,600 feet. Little is known about the trend status or threats to the species, but it may be impacted by recreational activities and other disturbances along the margins of its habitat. Within the planning area, it is known in one population on BLM-administered land in western Uinta County.

Divergent Wild Buckwheat. Divergent wild buckwheat is a WYNDD-sensitive annual herb ranked by the Natural Heritage Network as state critically imperiled and globally secure. Divergent wild buckwheat is a low-spreading annual that grows in cushion plant and bunchgrass communities or on the edges of sagebrush grasslands. This species prefers barren or semibarren clay, shale, or sandstone hills and washes

at elevations of 6,250 to 7,500 feet. The distribution of divergent wild buckwheat in Wyoming includes the Great Divide and Green River basins in Sublette, Sweetwater, Lincoln, and Uinta counties. Impacts and threats from oil and gas development in or around divergent wild buckwheat populations are unknown. Within the planning area, it is known in five locations in Lincoln, Uinta, and Sweetwater counties.

Nevada Sweetpea. Nevada sweetpea is a WYNDD-sensitive perennial herb that has Natural Heritage Network rankings of globally and trinomially secure and state critically imperiled. In Wyoming, Nevada sweetpea is known from the north slope of the Uinta Range in Uinta County and a location in Hot Springs County. Nevada sweetpea is found in mesic meadows and willow communities on clay soils at elevations of 8,680 to 8,800 feet. Trend status and threats are unknown for this species. Nevada sweetpea occurs on land managed by the Wasatch-Cache National Forest and the BLM Kemmerer Field Office. In the planning area, it occurs in one location in southern Uinta County.

Narrow-leaved Bladderpod. Narrow-leaved bladderpod is a WYNDD-sensitive perennial forb with Natural Heritage Network rankings of globally secure, trinomially rare, and state critically imperiled. In Wyoming, narrow-leaved bladderpod is found from the Sierra Madre and Uinta Mountains and the Green River basin in Carbon, Sweetwater, and Uinta counties. It grows in cushion plant or sagebrush and juniper grassland communities on windswept ridges, gravelly hills, rocky knolls, or clay hillsides at elevations of 6,500 to 8,700 feet. Trend status is not known, but abundance is usually low at known sites. Threats to the narrow-leaved bladderpod include surface disturbances along rim areas. Narrow-leaved bladderpod occurs on land managed by the Medicine Bow National Forest and the BLM Kemmerer Field Office. In the planning area, it occurs in one site in southeastern Uinta County.

Juniper Prickly-pear. Juniper prickly-pear is a WYNDD-sensitive clump-forming perennial succulent cactus ranked as critically imperiled in Wyoming and trinomially rare and globally secure throughout its range by the Natural Heritage Network. Juniper prickly-pear is found from eastern Utah and southwestern Wyoming to western Colorado, northern Arizona, and New Mexico. Habitat includes sandy soils of flats, washes, and hillsides in desert shrub, grassland, and open grassy flats in southern pinyon-juniper woodlands. The Wyoming populations are peripheral and occur in sandy or gravelly substrates with desert shrubs at elevations of 6,120 to 6,950 feet. Abundance, trend, and threats to juniper prickly-pear are unknown. Juniper prickly-pear occurs on lands within the Flaming Gorge National Recreation Area, the BLM Kemmerer and Pinedale field offices, and the Seedskadee National Wildlife Refuge. Within the planning area, juniper prickly-pear is located in the Green River basin in Sublette and Sweetwater counties, including one occurrence on the east-central boundary in western Sweetwater County.

Rufous-spine Prickly-pear. Rufous-spine prickly-pear is a WYNDD-sensitive perennial succulent cactus ranked by the Natural Heritage Network as globally and trinomially secure and with a state ranking of imperiled. In Wyoming, rufous-spine prickly-pear is a peripheral species known from the Green River and Washakie basins in Sweetwater and Lincoln counties. Rufous-spine prickly-pear grows in sagebrush grassland, salt desert shrublands, and vegetated sand dunes on slopes and buttes at elevations of 6,500 to 7,100 feet. Abundance, trend, or threats are not known for the species. Rufous-spine prickly-pear occurs on land managed by the Flaming Gorge National Recreation area and the BLM Kemmerer, Rawlins, and Rock Springs field offices. Within the planning area, rufous-spine prickly-pear is known in one location in southeastern Lincoln County.

Garrett's Beardtongue. Garrett's beardtongue is a WYNDD-sensitive perennial forb with Natural Heritage Network rankings of globally secure, trinomially rare, and state critically imperiled. Garrett's beardtongue is a regional endemic of northeastern Utah and southwestern Wyoming, known in Wyoming from the Green River basin and northern foothills of the Uinta Range in Sweetwater and Uinta counties. In Wyoming, Garrett's beardtongue is found in rolling semibarren badlands on clay soils, openings within vegetative communities on gentle clay slopes covered with small slate fragments, or on steep clay or talus

slopes covered with slate chips below steep cliffs at elevations of 7,600 to 8,400 feet. Threats include impacts from surface disturbances, road construction, and vehicle trampling. Within the planning area, it is found in eastern Uinta County.

Desert Glandular Phacelia. Desert glandular phacelia is a WYNDD-sensitive annual or biennial herb ranked by the Natural Heritage Network as globally secure, trinomially imperiled to critically imperiled, with state ranking of critically imperiled. Desert glandular phacelia usually grows on outcrops of the Green River Formation, but may also occur on Bridger Formation deposits. Desert glandular phacelia grows on semibarren south- or west-facing upper slopes in gray clay shale covered by fragmented slate. Less often, desert glandular phacelia may occur on chalky, limey-slate outcrops dominated by cushion plants, or in openings within shadscale, green rabbitbrush, and greasewood mixed shrubland. Desert glandular phacelia is endemic to the Great Divide basin and the desert foothills of the Overthrust Belt in southwestern Wyoming in Lincoln, Sweetwater, and Sublette counties. One occurrence is known in the planning area in southeastern Lincoln County. General threats to desert glandular phacelia include OHV use and mineral exploration. The BLM Kemmerer, Pinedale, Rawlins, and Rock Springs field offices and the Flaming Gorge National Recreation Area have known populations of desert glandular phacelia within their jurisdictional boundaries.

White-margined Phlox. White-margined phlox is a WYNDD-sensitive perennial herb with Natural Heritage Network rankings of globally secure and Wyoming State critically imperiled. White-margined phlox is a regional endemic on the edge of its range found on rocky slopes and flats in Lincoln County. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer Field Office. There is one known population within the planning area in southwestern Lincoln County.

Deep Creek Cinquefoil. Deep Creek cinquefoil is a WYNDD-sensitive perennial herb and ranked by the Natural Heritage Network as globally rare to secure and state critically imperiled. Deep Creek cinquefoil is on the edge of its range and occurs on rocky desert hills and ridges in Sweetwater and Uinta counties. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer and Rock Springs field offices. Only one population is located in the planning area and it is in southeastern Uinta County.

Douglas' Campion. Douglas' campion is a WYNDD-sensitive perennial forb ranked by the Natural Heritage Network as globally secure and state critically imperiled. Douglas' campion is on the edge of its range and occurs on hills and slopes in western Lincoln County (BLM 2003a). Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer Field Office. One population within the planning area is in western Lincoln County.

Description of Existing Management

Consultation is required on any action that a federal agency proposes that (1) may adversely impact a federally listed species or (2) will result in jeopardy or adverse modification of critical habitats. Determining adverse impacts or lack of adverse impacts to species or their habitats is made in consultation with the USFWS or the National Marine Fisheries Service. A recovery plan for Ute ladies'-tresses (USFWS 1995), the only federally listed species potentially occurring in the planning area, is available to aid in management of the species and its habitats.

No management actions are permitted on BLM lands that would jeopardize the continued existence of species federally listed, proposed for listing, or candidates for listing. The Kemmerer Field Office requires surveys of all areas of suitable habitats for Ute ladies'-tresses prior to engaging in surface-disturbing activities. Appropriate measures to protect all special status species are applied to agency actions and use authorizations. These measures could include avoidance or use restrictions (e.g., no surface occupancy [NSO] restriction, no surface disturbance, and seasonal restrictions).

Currently, an NSO restriction for fluid minerals applies to four populations of Dorn's twinpod, *Physaria dornii*, and a cushion plant community containing five endemic plant species (BLM 1986a). The cushion plant community is a unique plant community with associated endemic plants that occurs within the planning area. At present, five separate population occurrences of Dorn's twinpod making up smaller scattered populations totaling approximately 475 acres. The current NSO restriction for fluid minerals protects four populations of Dorn's twinpod, approximately 131 acres. The cushion plant community NSO restriction comprises approximately 62 acres out of 13,000 acres delineated by the WYNDD as containing scattered cushion plant areas. The existing cushion plant NSO restriction for fluid minerals does not include a known population of the endemic tufted twinpod, which is on the Wyoming BLM sensitive species list. This population is located in a cushion plant area within the area delineated by the WYNDD. Seven other species on the Wyoming BLM sensitive species list have no formal NSO restrictions for fluid minerals.

When use restrictions are not implemented, mitigation measures can be used to lessen adverse impacts to special status species. However, mitigation options to avoid or reduce impacts to rare plants may be limited due to specific habitat requirements or lack of necessary biological information to make such an assessment. Most of the common techniques, such as offsite compensation or habitat restoration, have proven largely unsuccessful, although seedbanking is commonly performed to attempt offsite propagation. Mitigation plans for areas where impacts to these species cannot be avoided are designed to provide special management actions that minimize the overall impact to the species. However, due to the difficulties of providing successful mitigation options, impacts to candidate plants are considered less than substantial only if no net loss of population size or habitat quality results. "No net loss" is intended to mean that the BLM must "ensure that [actions authorized, funded, or carried out by BLM]…affecting the habitat of candidate species are carried out in a manner that is consistent with the objectives for managing those species. BLM shall not carry out any actions that would cause any irreversible or irretrievable commitment of resources or reduce the future management options for the species involved" (BLM 2001d).

Management of special status plant species in the planning area has a number of challenges. Among these are historical and current activities, habitat conditions and trends, and identified threats to plant populations and habitats. While threats to some plant species may remain low due to the inaccessibility of the habitats they occupy, threats to other species will remain or increase. Management challenges for special status plant species include spreading of INNS in native habitats, herbivory and physical trampling by livestock, reduced functional condition for riparian and wetland habitats, impaired floodplain connectivity, water depletions, vegetation treatments with prescribed fire or herbicides, impacts by OHV use and other forms of recreation, loss of wetland habitat due to altered hydrology, and habitat modification by development or other sources of disturbance.

BLM addresses these management challenges according to BLM Manual 6840 - Special Status Species Management (BLM 2001d) with the objectives to (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species either under the provisions of the ESA or BLM Manual 6840.

Management actions to address the challenges for federally listed plant species often are derived from the consultation process (i.e., Section 7 of the ESA). Management actions for special status plant species focus on the following goals of the BLM Wyoming Sensitive Species Policy and List (BLM 2002c). Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

- Maintain vulnerable species and habitat components in functional BLM ecosystems
- Ensure special status species are considered in land management decisions
- Prevent a need for species listing under the ESA
- Prioritize needed conservation work with an emphasis on habitats

3.4.7 Special Status Species – Fish

The Kemmerer Field Office is responsible for managing fisheries habitat, while management of fish species is overseen by state and federal wildlife management agencies. The WGFD manages resident fish populations. The USFWS provides regulatory oversight for all fish species that are listed, proposed for listing, or are candidates for listing under the ESA.

Special status fish species are those listed as threatened or endangered, are proposed for listing, or are candidates for listing under provisions of the ESA; those listed by a state implying potential endangerment or extinction; or those designated by each BLM state director as sensitive. Lists of special status species are maintained under federal and state authority, including a March 1990 MOU between the WGFD and Wyoming BLM (WGFD and BLM 1990). BLM Wyoming Sensitive Species Policy and its species list are provided in an annually updated memorandum (BLM 2002c; USFWS 2004). The BLM Wyoming State Office conducts an annual review of its sensitive species list to make additions or deletions based on the most current information on species status. Table 3-19 identifies endangered and sensitive fish species that may be impacted by BLM activities in the planning area.

Fisheries habitat includes perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Fisheries habitats in the planning area encompass portions of three (3rd-order) regional watersheds: the Green River, Bear River, and Snake River. Of these, only the Green River watershed contributes flows to the Colorado River. See the Water section of this Chapter for more detail regarding these watersheds.

Federal actions resulting in water depletions to the Colorado River system may impact the following endangered species: bonytail, Colorado pikeminnow, humpback chub, and razorback sucker downstream in the Green and Colorado river systems. Three of these species (bonytail, Colorado pikeminnow, and razorback sucker) have not occurred in Wyoming since the impoundment of the Flaming Gorge Dam in 1963. The humpback chub has inhabited only the downstream tributaries of the Colorado and Green rivers. In general, depletions include evaporative losses and (or) consumptive use of surface or groundwater within the impacted basin, often characterized as diversions less return flows. Project elements potentially associated with depletions include, but are not limited to, ponds, lakes, pipelines, wells, diversion structures, and water treatment facilities.

Water depletions upstream can change the velocity, volume, and timing of downstream river water flows. Historically, water development projects (e.g., dams, reservoirs, water and sediment control basins, irrigation diversions, sand and gravel mining, and wetland creation) have altered historic surface water hydrographs (e.g., water flow timing, volume, and velocity) in the Colorado River ecosystem through consumption, evaporation, or by altering the timing of water flows.

Seven BLM-sensitive fish species occur in the planning area: roundtail chub, leatherside chub, bluehead sucker, flannelmouth sucker, Colorado River cutthroat trout, Bonneville cutthroat trout, and the fine-spotted Snake River cutthroat trout. Table 3-20 identifies the streams in which each sensitive fish species occurs in the planning area. BLM has limited information on the population sizes or trends of roundtail chub, leatherside chub, bluehead sucker, and flannelmouth sucker. Population sizes vary from year to year and stream to stream. For example, Bonneville cutthroat trout numbers in the main stem of Raymond Creek doubled between 1976 and 1977, but dropped by one-third by 1987 to 380 fish per mile (BLM 2003a). Salt Creek populations have remained steady, whereas the Thomas Fork River and Coal Creek dropped to zero fish in 1992 and 1989, respectively (BLM 2003a). Snake River cutthroat trout populations in the Star Valley appear to be abundant and fairly stable (BLM 2003a). For detailed life histories and habitat requirements, refer to *Fishes of Wyoming* (Baxter and Stone 1995).

The three subspecies of cutthroat trout present in the planning area are native to Wyoming and listed as sensitive due to low population numbers of pure strain stock and declining habitats. Declines are due to

extended drought conditions and past land management activities. For Colorado River cutthroat trout, declines also are due to hybridization. Human activities have disconnected headwater streams through irrigation diversions, canals, and other dewatering practices. These activities can benefit these species by keeping nonnative fish away and preventing hybridization, but they also can harm these species by preventing historic genetic mixing of the various populations.

Table 3-19. Endangered and Sensitive Fish Species Potentially Impacted by BLM Activities in the Kemmerer Planning Area

Common Name	Status[1]	Habitats
Bonytail	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Colorado pikeminnow	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Humpback chub	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Razorback sucker	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Roundtail chub	Sensitive, NSS1	Colorado river drainage, mostly large rivers, also streams and lakes
Leatherside chub	Sensitive, NSS1	Bear, Snake, and Green river drainages; clear, cool streams and pools
Bluehead sucker	Sensitive, NSS1	Bear, Snake, and Green river drainages, all waters
Flannelmouth sucker	Sensitive, NSS1	Colorado River drainage, large rivers, streams and lakes
Colorado River cutthroat trout	Sensitive, NSS2	Colorado River drainage, clear mountain streams
Bonneville cutthroat trout	Sensitive, NSS2	Bear River drainage, clear mountain streams
Fine-spotted Snake River cutthroat trout	Sensitive, NSS4	Snake River drainage, clear, fast water

Sources: BLM 2002c; USFWS 2004

[1] Status: Sensitive = BLM Sensitive Species; Threatened, Endangered, Proposed, Candidate = in accordance with the ESA.
State-listed definitions:

NSS1 - Native Species Status 1	Populations are greatly restricted or declining, extirpation appears possible OR on-going significant loss of habitat.
NSS2 - Native Species Status 2	Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~*
	Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; ongoing significant loss of habitat.
NSS3 - Native Species Status 3	Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~*
	Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~*
	Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.
NSS4 - Native Species Status 4	Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted. *~OR~*
	Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~*
	Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~*
	Populations are stable or increasing and not restricted in numbers and (or) distribution; ongoing significant loss of habitat.

Table 3-20. Streams in Which Sensitive Fish Species Occur in the Kemmerer Planning Area

Species	Stream Occurrence in the Kemmerer Planning Area
Roundtail chub (nongame)	Blacks Fork
	Hams Fork (Granger area)
Leatherside chub (nongame)	Muddy Creek (Bear River)
	Twin Creek
	Sulphur Creek
	Willow Creek (Hams Fork)
	Third Creek
Bluehead sucker (nongame)	Salt Creek (Thomas Fork)
	Hams Fork (Granger area)
	Salt River (Star Valley)
	Green River
Flannelmouth sucker (nongame)	Muddy Creek (Blacks Fork)
	Slate Creek
	Hams Fork (Granger area)
	Smiths Fork River (Blacks Fork)
	Green River
Snake River cutthroat trout (game)	Salt River (Star Valley)
	Willow Creek (main and east fork of Star Valley)
	Smiths Fork River
	Hobble Creek
	Green River
Colorado River cutthroat trout (game)	Willow Creek (Blacks Fork)
	East Muddy Creek
	West Muddy Creek
	Cottonwood Creek (upper reaches)
	Horse Creek (Blacks Fork)
	Smiths Fork River, west fork (Blacks Fork)
Bonneville cutthroat trout (game)	Raymond Creek
	Huff Creek
	Muddy Creek (Smiths Fork)
	Coal Creek (Thomas Fork)
	Coal Creek, Howland (Smiths Fork)
	Little Muddy Creek (Thomas Fork)
	Smiths Fork River (Bear)
	Hobble Creek
	Grade Creek
	Watercress Creek
	Salt Creek (Thomas Fork)
	Porcupine Creek

Source: BLM 2003a

Fisheries habitats are closely tied with stream riparian conditions. Approximately 30 percent of stream riparian areas where these sensitive fish species occur are in proper functioning condition (BLM 2003a). The other 70 percent are either functional at-risk or nonfunctional, indicating some components are lacking and the stream is susceptible to degradation.

BLM-sensitive species are in need of special management attention due to reduced or declining populations and (or) habitat. Historic activities that have contributed to altering aquatic habitats in the planning area include agriculture, fire and fuels management, vegetation management, development, OHV use, recreation, and land development. In addition to water depletion from historic activities (e.g., irrigation diversions), aquatic habitats in the planning area have been altered through activities that result in soil compaction or erosion; increased sedimentation of streams; removal and degradation of riparian vegetation; changes in water temperature, velocity, volume, or timing; and the spread of INNS in riparian corridors.

While fisheries habitat conditions in the planning area are a function of historic activities, they are also actively managed by BLM to (1) conserve listed species and the ecosystems on which they depend, and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species, either under the provisions of the ESA, BLM Manual 6840 (BLM 2001d), or BLM Wyoming Sensitive Species Policy and List (BLM 2002c). BLM is part of a conservation agreement and strategy for Colorado River cutthroat trout (CRCT Task Force 2001).

Management challenges for special status fish species in the planning area include balancing the needs of special status fish with competing needs of other resource programs, resource uses, and potential impacts to local economies; encroachment of INNS in riparian corridors; management of public access; land-tenure adjustments; water rights and produced water from wells; floodplain connectivity and stream channel degradation; and water quality degradation and potential toxicity associated with contaminants and sedimentation in the watershed. Recognizing that management actions for federally listed species are often derived from the consultation process (i.e., Section 7 of the ESA), the BLM has identified management actions in the alternatives described in Chapter 2 to address the challenges identified.

3.4.8 Special Status Species – Wildlife

Special status species are those listed as threatened or endangered, are proposed for listing, or are candidates for listing under the provisions of the ESA; those listed by a state implying potential endangerment or extinction (i.e., native species status [NSS]); or those designated by the BLM State Director as sensitive. The BLM defines sensitive species as those that could easily become endangered or extinct in a state unless protection is granted. Designated sensitive species are provided the same level of protection by the BLM as federal candidate species.

Within the planning area, three wildlife species (bald eagle, black-footed ferret, and Canada lynx) are listed as threatened or endangered and one wildlife species (gray wolf) is listed as nonessential/experimental under the ESA (USFWS 2004). In addition, one candidate species, the yellow-billed cuckoo, may be impacted. One species, the grizzly bear, was delisted from threatened status on March 29, 2007 (USDI 2007b), but is a BLM sensitive species. Including the grizzly bear, twenty-two species are listed as sensitive in the planning area (BLM 2002c). No critical habitat occurs in the planning area. Known distributions of special status wildlife species within the planning area appear on Map 24.

Special status wildlife species in the planning area inhabit a variety of habitat types, including sagebrush shrublands (e.g., sage sparrow, sage thrasher, greater sage-grouse, loggerhead shrike, ferruginous hawk), grassland (e.g., long-billed curlew, burrowing owl, white-tailed prairie dog), and riparian and wetland habitats (e.g., northern leopard frog, long-eared myotis, yellow-billed cuckoo, white-faced ibis). For most

special status species, comprehensive data on population numbers and distribution within the planning area are not available.

Table 3-21 identifies all special status wildlife species that (1) occur in, (2) have potential habitats in, or (3) could be influenced by activities in the planning area. Table 3-21 also summarizes the status and general habitat for each special status wildlife species.

A brief summary of the habitats and existing conditions of each species identified in Table 3-21 is provided in the remainder of this section. It is important to note that some special status species use a variety of habitat types to complete their life-cycle and it is not the intention of this document to provide an exhaustive description of each species' habitat requirements, natural history, or biology. The management challenges facing each species and management actions considered by the BLM for addressing these challenges are described. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Trophy Game

Grizzly bear. The grizzly bear is a sensitive species. The Yellowstone Distinct Population Segment (DPS) was delisted from threatened status under the ESA on March 29, 2007 (USDI 2007b). In Wyoming, grizzly bears may be found in coniferous forests, mountain-foothills shrublands, riparian shrub, and mountain-foothills grassland (Cerovski et al. 2004). No grizzly bears are known to exist within the planning area. However, the WGFD grizzly bear analysis unit does encompass the northern portion of the planning area, extending down to the town of Kemmerer (BLM 2005e). Although grizzly bears do not currently occur in the planning area, it is possible for them to disperse to the planning area. In 2002, a grizzly bear was killed in the Blind Bull drainage near Deadman Mountain on the Bridger-Teton National Forest approximately 50 miles north of the planning area boundary. A *Wyoming Grizzly Bear Management Plan* was completed by WGFD in 2002 and amended in 2005 (Moody et al. 2005). The BLM will adhere to the five-year monitoring process for this species and apply conservation measures where necessary.

Furbearing Animals

Canada lynx. The Canada lynx is a federally threatened species. Canada lynx are secretive cats of coniferous or mixed forests of northern latitudes and high mountains. Snowshoe hares are the primary prey of Canada lynx, and snowshoe hare abundance is a limiting factor for Canada lynx. Forested landscapes containing a variety of seral stages provide foraging, denning, and travel or dispersal habitats for Canada lynx. The patchiness and distribution of Canada lynx habitats are factors in the vulnerability of the species. The habitat within good patches and the travel corridors between patches is essential for the Canada lynx (BLM 2005f). Alteration of natural disturbance regimes, various forest management practices, road building, and some recreational activities may affect Canada lynx habitats suitability. Several occurrences of Canada lynx are documented for the northern edge of the planning area.

There are 24 LAUs designated for the planning area, including two stand-alone LAUs at the south end of the Bridger-Teton National Forest, Commissary Ridge and Dempsey Ridge (BLM 2005f). Habitat has been delineated for the planning area in the north, in the two stand-alone LAUs, and in the south as an extension of the Wasatch National Forest LAUs. Some of this habitat is located within LAUs, and some is not. The delineated habitat separate from LAUs, as that which occurs in the northern part of the planning area, reflects the fact that the habitat was not of sufficient size to delineate an LAU, but can be recognized and protected as potential habitat on its own.

Table 3-21. Special Status Wildlife Species Occurring or Potentially Occurring in the Kemmerer Planning Area

Common Name	Status[1]	Habitat
Trophy Game		
Grizzly bear	Sensitive, NSS3	Montane forests
Furbearing Animals		
Canada lynx	Threatened, NSS1	Montane forests
Predatory Animals		
Gray wolf	Nonessential/experimental	Greater Yellowstone ecosystem
Game Birds		
Greater sage-grouse	Sensitive, NSS2	Basin-prairie shrub, mountain-foothill shrub
Nongame (Raptors)		
Bald Eagle	Threatened, NSS2	Cottonwood riparian, mixed coniferous forests near large lakes and rivers
Northern goshawk	Sensitive, NSS4	Conifer and deciduous forests
Ferruginous hawk	Sensitive, NSS3	Basin-prairie shrub, grassland, rock outcrops
Peregrine falcon	Sensitive, NSS3	Tall cliffs
Burrowing owl	Sensitive, NSS4	Grassland, basin-prairie shrub
Nongame (Neotropical Migrants)		
White-faced ibis	Sensitive, NSS3	Marshes, wet meadows
Trumpeter swan	Sensitive, NSS2	Lakes, ponds, rivers
Long-billed curlew	Sensitive, NSS3	Grassland, plains, foothills, wet meadows
Yellow-billed cuckoo	Candidate, NSS2	Riparian areas west of the Continental Divide; open woodlands, streamside willow, and alder groves
Mountain plover	Sensitive	Shortgrass prairies and shrubsteppe; prefers areas with little vegetative cover, such as prairie dog towns (USFWS 2003)
Loggerhead shrike	Sensitive	Basin-prairie shrub, mountain-foothill shrub
Sage thrasher	Sensitive, NSS4	Basin-prairie shrub, mountain-foothill shrub
Brewer's sparrow	Sensitive, NSS4	Basin-prairie shrub
Sage sparrow	Sensitive, NSS4	Basin-prairie shrub, mountain-foothill shrub
Nongame (Mammals)		
Long-eared myotis	Sensitive, NSS2	Conifer and deciduous forests, caves and mines
Pygmy rabbit	Sensitive, NSS3	Basin-prairie and riparian shrub
White-tailed prairie dog	Sensitive, NSS3	Basin-prairie shrub, grasslands
Idaho pocket gopher	Sensitive, NSS3	Shallow stony soils
Black-footed ferret	Endangered, NSS1	Prairie dog towns
Nongame (Amphibians)		
Northern leopard frog	Sensitive, NSS4	Beaver ponds, permanent water in plains and foothills
Great Basin spadefoot	Sensitive, NSS4	Sagebrush communities, spring seeps, permanent and temporary waters
Boreal toad	Sensitive, NSS2	Pond margins, wet meadows, riparian areas
Spotted frog	Sensitive, NSS4	Ponds, sloughs, small streams

Sources: USFWS 2004; BLM 2002c

[1] Status: Sensitive = BLM Sensitive Species; Threatened, Endangered, Proposed, Candidate = in accordance with the ESA; State-listed definitions:

NSS1 - Native Species Status 1	Populations are greatly restricted or declining, extirpation appears possible OR on-going significant loss of habitat.
NSS2 - Native Species Status 2	Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; ongoing significant loss of habitat.
NSS3 - Native Species Status 3	Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.
NSS4 - Native Species Status 4	Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are stable or increasing and not restricted in numbers and (or) distribution; ongoing significant loss of habitat.

Predatory Animals

Gray wolf. Gray wolves are listed as experimental/nonessential species under the ESA resulting from the reintroduction of wolves in Yellowstone National Park. This population has experienced rapid growth since the reintroduction program began in 1995. Gray wolves are currently listed in Wyoming as predatory animals and may be taken any time of year without limit. However, because of their status under the ESA, gray wolves are not currently managed pursuant to Wyoming statute and regulations (BLM 2004h). Gray wolves are primarily managed by the USFWS, NPS, and USDA APHIS Wildlife Services. Gray wolves are habitat generalists and may inhabit a wide variety of habitat types. The main habitat requirements for gray wolves include the presence of abundant prey (i.e., elk) and relatively low levels of human activity (BLM 2004h). Dispersing gray wolves are capable of traveling very long distances. Human activities associated with roads and other linear corridors cause fragmentation of gray wolf habitats. The major causes of mortality among gray wolves are legal and illegal harvest, depredation control, and vehicle collisions (BLM 2004h).

The planning area provides suitable habitats for gray wolves because it is mostly undeveloped and an abundance of prey such as deer, elk, and moose are present. One gray wolf pack extends onto the planning area from the Pinedale planning area, but is located on USFS land (BLM 2004h). Lone gray wolves and small groups of gray wolves have been observed around Cokeville and as far south as Kemmerer (BLM 2004h).

A petition to revise the listed status of the gray wolf by establishing the northern Rocky Mountain DPS and to concurrently remove the gray wolf in the northern Rocky Mountain DPS from the list of endangered and threatened species was submitted in June 2005. On February 8, 2006, the USFWS announced an advanced notice of proposed rulemaking that outlines the intent of the USFWS to remove gray wolves in the northern Rocky Mountains from the federal list of threatened and endangered species (USFWS 2006a). The USFWS recommends designating and proposing to delist a DPS of gray wolves in the northern Rocky Mountains that have exceeded biological recovery goals and no longer require protection under the ESA. The gray wolf DPS would include all of Montana, Idaho, and Wyoming; the eastern third of Washington and Oregon; and a small part of north-central Utah. This recommendation is contingent upon the State of Wyoming implementing a USFWS-approved state law and gray wolf management plan, as required under the ESA. The WGFD completed the *Wyoming Gray Wolf Management Plan* in 2003 (WGFD 2003a).

Game Birds (Greater sage-grouse)

The greater sage-grouse is a BLM sensitive species and for this document is assumed to represent other sagebrush-dependent species. Populations of greater sage-grouse have declined throughout their native range in western North America. Several petitions to list greater sage-grouse as threatened were submitted to USFWS in 2002. In January 2005, the USFWS determined that listing under the ESA was not warranted. Greater sage-grouse habitat components and terminology referenced in the following discussion are defined in BLM's Instruction Memorandum (IM) Number (No.) WY-2004-057, Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval (BLM 2004i). Additional information regarding greater sage-grouse habitat needs and habitat and population trends is provided by Braun (2002) and Connelly et al. 2000.

The greater sage-grouse is the largest species of grouse in North America. It is appropriately named due to its year-round dependence on sagebrush for both food and cover. This close relationship with sagebrush is reflected in the greater sage-grouse's North American distribution, particularly for big sagebrush and silver sagebrush. The association with sagebrush is perhaps most evident in the late autumn, winter, and early spring when greater sage-grouse are completely dependent on sagebrush for both food and cover. No less important is the reliance of greater sage-grouse on sagebrush for protective nest cover during the breeding season.

In general, the greater sage-grouse is a mobile species, capable of movements greater than approximately 31 miles (50 kilometers) between seasonal ranges. Despite this mobility, greater sage-grouse appear to display substantial fidelity to seasonal ranges. For more detailed discussions regarding greater sage-grouse habitats, see Connelly et al. 2004.

Up until the middle of the twentieth century, greater sage-grouse flourished in Wyoming and throughout most of the West. By the mid 1950s, biologists in the western United States began to express concern about populations of sage-grouse and sagebrush-steppe habitats that ultimately led to establishing the Western States Sage-Grouse Technical Committee in 1956. By most accounts, including the recently completed range-wide *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* (Connelly et al. 2004), the numbers of greater sage-grouse have declined across their range during the past 50 years, as have the quality and distribution of the bird's requisite sagebrush-steppe habitats.

Population declines of greater sage-grouse are largely attributed to the loss and degradation of sagebrush habitats (Martin 1970; Braun et al. 1977; Swenson et al. 1987; Braun 2002). Changes in land use and land development are the primary causes of habitat loss, while habitat degradation is a complicated interaction among many factors, including drought, livestock grazing, changes in natural fire regimes, and the invasion of INNS (Fischer et al. 1996; Pyle and Crawford 1996; Beck and Mitchell 2000; Nelle et al. 2000). Emerging issues on greater sage-grouse populations include impacts of pesticides, diseases, wind turbines, and raptor perch sites on powerlines.

Numerous primary and satellite leks have been documented within the central and southern portion of the planning area (See Map 24). The BLM assists the WGFD in conducting annual lek attendance counts to monitor local population trends.

In 2004, Wyoming formed eight greater sage-grouse local working groups across the state to develop and implement local greater sage-grouse conservation plans. A description of seasonal and spatial stipulations for greater sage-grouse are identified as management actions for existing management and alternatives in Chapter 2. *The Wyoming Greater Sage-Grouse Conservation Plan* (Wyoming Sage-Grouse Working Group 2003) sets out multiagency guidelines for managing of greater sage-grouse populations and habitats in Wyoming, focusing on implementation by local working groups. Conservation efforts have primarily occurred through the project review process conducted by state and federal agencies, with an emphasis on minimizing disturbance during the breeding season within and around the lek sites and protections for greater sage-grouse nesting and early brood rearing habitats, and winter concentration areas.

Nongame (Raptors)

Bald eagle. The bald eagle is a federally threatened species. USFWS proposed delisting of the bald eagle on July 6, 1999 (64 Federal Register 36454) and is still proposed for delisting (USFWS 2006b). If the bald eagle were delisted, it would continue to be protected under the Bald and Golden Eagle Protection Act. Bald eagles are large, primarily fish-eating raptors, although they also consume waterfowl and carrion. Bald eagles nest near large bodies of water, including lakes, reservoirs, and large rivers. Nest sites typically are located in large trees adjacent to water.

Two documented winter roost sites occur in the planning area: the Woodruff Narrows roost and the Morgan Canyon roost. The Woodruff Narrows roost supports one of the largest wintering populations of bald eagles in Wyoming. From November through February, approximately 25 to 75 birds roost in cottonwood trees and forage on carrion and various other prey species. The Morgan Canyon roost historically supports approximately 5 to 15 birds that roost in a patch of subalpine fir trees approximately 10 acres in size. Eagles utilizing this roost commonly feed on carrion associated with a nearby big game winter range. An additional roost site, identified as the Rock Creek Roost, is located in Nugget Canyon in six mature conifer trees. This roost is located along Twin Creek adjacent to State Highway 30 and an

active railroad. It is currently unknown as to whether this is a satellite of the Morgan Canyon Roost or a separate roosting area. Eagles are commonly attracted to this area due to the high incidence of road-killed animals from wildlife collisions with vehicles in the canyon area providing ample carrion on which to forage. Seven bald eagle nest sites have been documented within the planning area, although none is located on lands administered by the BLM (BLM 2003g).

Northern goshawk. The northern goshawk is a large accipiter associated with coniferous forests and aspen stands and is a seasonal migrant in the planning area. Nesting habitats are generally in coniferous forests, and northern goshawks often forage throughout the forest, including aspen stands, meadows, and forest openings. The limited amount of suitable forested areas in the planning area indicates that few nesting northern goshawks are present. No known active nests occur within the planning area.

Ferruginous hawk. The ferruginous hawk occurs in grassland and shrublands during the spring, summer, and fall seasons throughout the planning area. Ferruginous hawks often nest on the ground, lone trees, topographic high points, or cliffs. Ferruginous hawks occur in areas with abundant prey, typically grassland rodents and lagomorphs (Johnsgard 1990). There are numerous ferruginous hawk nest sites in the planning area. This species is considered sensitive to disturbance during the nesting period.

Peregrine falcon. The peregrine falcon is a mid- to large-sized falcon associated with a variety of habitats during the spring, summer, and fall seasons. Nesting habitats for this species include cliffs, canyons, or other secure topographic features typically near larger water bodies. Nesting sites are often found near an abundant prey base. This species is considered uncommon within the planning area; however, it has been observed migrating through the area. This species was delisted from the federal endangered species list in 1999.

Burrowing owl. The burrowing owl is a mid-sized owl closely associated with prairie dog colonies within the planning area. The burrowing owl is generally found nesting within or adjacent to prairie dog towns. This species is relatively tolerant of human activity.

Nongame (Neotropical Migrants)

White-faced ibis. The white-faced ibis occurs in marshes, wet-moist meadows, lakes, and irrigated meadows (Cerovski et al. 2004). In the planning area, white-faced ibis have been documented north of Fontenelle Reservoir and have been observed near Big Piney during the spring migration.

Trumpeter swan. The trumpeter swan is an occasional migrant that nests on muskrat houses or small islands in open water; however, no breeding populations are known to occur in the planning area. The trumpeter swan feeds mainly on aquatic vegetation and macroinvertebrates. Trumpeter swans are found in the extreme eastern and western regions of Wyoming.

Long-billed curlew. The long-billed curlew is an upland shorebird occupying grassland and wet meadows in the planning area. Long-billed curlews typically nest in prairie and grassy meadows near water, but occasionally choose dry upland sites. Typical nest sites are on the ground near water and a supply of insects and aquatic macroinvertebrates. This species has been observed foraging in areas adjacent to the Bear River and Hams Fork River drainages.

Yellow-billed cuckoo. The western U.S. DPS of the yellow-billed cuckoo is a federal candidate species under the ESA. In Wyoming, only yellow-billed cuckoos found west of the Continental Divide are considered part of the western DPS. Yellow-billed cuckoos are secretive, robin-sized birds that breed in willow and cottonwood communities along rivers and streams. The bird primarily eats large insects, including caterpillars and cicadas, as well as the occasional small frog or lizard. Breeding habitats include open woodland (especially where undergrowth is thick), parks, and deciduous riparian woodland. In the West, the yellow-billed cuckoo nests in tall cottonwood and willow riparian woodland.

Yellow-billed cuckoo are considered rare in Wyoming and their breeding range in the state is unclear. The western DPS of yellow-billed cuckoos may be found along the Lower Green River basin, from Seedskadee National Wildlife Refuge to Flaming Gorge reservoir and west to the Bear River drainage, including a portion of the planning area (Bennett & Keinath 2001). One historic breeding observation and three additional nonbreeding observations are documented within the planning area (Bennett & Keinath 2001).

Mountain plover. The mountain plover inhabits shortgrass prairies and shrubsteppe habitats, both for breeding and wintering. This species prefers areas with little vegetative cover for nesting, particularly prairie dog towns. In 2003, the USFWS withdrew its proposal to list the mountain plover as threatened because information indicated that threats to this species were not significant and that the population was stable (USFWS 2003). Numerous sightings of mountain plover have been documented in the planning area.

Loggerhead shrike. Shrublands are the preferred habitats for the loggerhead shrike and are found throughout the planning area. This species typically nests in deciduous trees or tall shrubs and feeds on insects, small vertebrates, and carrion. Loggerhead shrikes generally inhabit open country with shrubs and low trees for nesting, and spiny shrubs so they can impale their prey (Porter et al. 1975).

Sage thrasher. The sage thrasher nests in large, open tracts of dry shrub and grassland with dense stands of sagebrush, bitterbrush, or rabbitbrush. Sage thrashers are common in suitable habitats within the planning area.

Brewer's sparrow. The Brewer's sparrow breeds in high-elevation shrubs and thickets, as well as in sagebrush deserts. Brewer's sparrow is common in suitable habitats throughout the planning area .

Sage sparrow. The sage sparrow nests in large tracts of arid shrub and sagebrush communities. Sage sparrow is common in suitable habitats within the planning area.

Nongame (Mammals)

Long-eared myotis (bat). The long-eared myotis utilizes coniferous forests, especially ponderosa pine and juniper, cottonwood-riparian, basin-prairie shrublands, and sagebrush-grassland habitat types (Cerovski et al. 2004). Roost sites for long-eared myotis include snags, loose bark, rock crevices, caves, and mines. Long-eared myotis are thought to hibernate in caves and mines. Like many bat species, the long-eared myotis is sensitive to human disturbance during hibernation (Cerovski et al. 2004). The long-eared myotis is thought to occur in suitable habitats throughout Wyoming, although the majority of records are from the western half of the state, including the planning area. The status of long-eared myotis in the planning area is unknown.

Pygmy rabbit. Pygmy rabbits depend on stands of medium-to-tall, dense sagebrush in conjunction with deep, friable soils to provide yearlong food, cover, and burrow sites (Keinath and McGee 2004). These habitats are often found in swales and drainages in a patchy distribution across the landscape. Pygmy rabbits in the Cumberland Gap area of the planning were found in tall, dense homogenous stands of basin big sage and mountain big sage; pygmy rabbits in the Moxa Arch area were located in desert mixed-shrub communities and burrows scattered along hillsides of sand (Purcell 2006).

In Wyoming, pygmy rabbits occur in the southwestern portion of the state, including the planning area. Recent surveys documented their range extending further east and northeast then previously known (Purcell 2006). Pygmy rabbits occur in suitable habitats throughout the planning area.

In May 2005, a petition to list the pygmy rabbit as threatened or endangered was found not to be warranted at this time. The USFWS concluded that the petition does not contain substantial scientific information to move ahead with a more detailed study of the species.

White-tailed prairie dog. White-tailed prairie dogs generally are found in desert grassland and shrub grassland habitats with moderate slopes at altitudes ranging between 5,000 and 10,000 feet. White-tailed prairie dogs are susceptible to rapid population declines resulting from flea-borne sylvatic plague. In addition, historic and current activities, including shooting, poisoning, and habitat conversion, have affected white-tailed prairie dog populations. White-tailed prairie dog colonies primarily occur in the central and eastern portions of the planning area on 30,913 acres of BLM-administered surface. Efforts are currently under way to document and map all colonies within the planning area.

The USFWS reviewed a petition to list the white-tailed prairie dog under the ESA and concluded the petition did not contain substantial scientific data that the petitioned action may be warranted (*Federal Register,* November 9, 2004).

Idaho pocket gopher. The Idaho pocket gopher occurs in shallow, stoney soils in sagebrush, sagebrush-grassland, and mountain meadows (Cerovski et al. 2004) and feeds on roots and plant parts of forbs, grasses, and herbs. The strongly fossorial Idaho pocket gopher is endemic to southwestern Wyoming and southeastern Idaho, extending slightly into southwestern Montana and northern Utah. It has been documented in Uinta, Lincoln and Sublette counties, including the planning area (Beauvais & Dark-Smiley 2005).

Black-footed ferret. The black-footed ferret is a federally endangered species. Black-footed ferrets are limited to open habitats, the same habitats used by prairie dogs, grassland, steppe, and shrubsteppe. Historically, black-footed ferrets ranged throughout the nonmountainous portion of Wyoming in areas that supported prairie dogs, their primary prey. The black-footed ferret was thought to be extirpated from virtually its entire range by the 1970s due to habitat loss, prairie dog eradication, disease, and shooting. Known ferrets in the wild currently are limited to reintroduced populations in South Dakota, Montana, Arizona, Utah, Colorado, Wyoming, and Chihuahua, Mexico (USFWS 2006c). The closest reintroduced population to the planning area is in the northwest corner of Colorado.

Two historic occurrences of black-footed ferrets were in the planning area. One observation was made in 1972 in Lincoln County, and one cranium and one mandible were collected in 1979 from Uinta County (BLM 2005g). Currently, there are no known populations of black-footed ferrets occurring within the planning area. From 2002 to 2004, approximately 58 black-footed ferret surveys were conducted for projects in the planning area. Several prairie dog complexes were identified as potentially suitable for black-footed ferret reintroduction (BLM 2005g).

Nongame (Amphibians)

Northern leopard frog. The northern leopard frog occupies riparian and wetland habitats and typically is found in cattail marshes and beaver ponds in the plains, foothills, and montane zones up to 9,000 feet above msl in the planning area. Adults feed on tadpoles, insects, and other invertebrates. Northern leopard frogs have been observed in the planning area.

Great Basin spadefoot. This species occupies sagebrush communities below 6,000 feet in elevation, west of the Continental Divide. The Great Basin spadefoot has been documented within the planning area Crews (2005).

Boreal toad. Boreal western toads can be found breeding in wet meadows, ponds, marshes, and other shallow waters in spring. In the summer, this species uses upland montane sites, usually within 300 to 1,500 feet of the breeding ponds. During hibernation, boreal western toads seek shelter under rocks, logs, or within rodent burrows (Keinath and Bennett 2000). Historic records for the species exist within the planning area (McGee & Keinath 2004).

Spotted frog. This species occurs in ponds, sloughs, and small streams in the foothills and montane zones, although spotted frogs may avoid warm, stagnant ponds with cattails (Cerovski et al. 2004). Limited information exists on the extent of this species in the planning area.

Management challenges for special status raptor species include habitat degradation, habitat loss, lack of cottonwood and aspen regeneration, and incompatible land use practices (e.g., land conversion, clear-cutting, snag removal, industrial activities, intensive recreational activities, and removal of burrowing mammals). Other challenges include impacts from contaminants and human disturbance during sensitive periods.

General management actions should focus on maintaining the presence of special status raptor species and the habitats on which they depend in the planning area. Seasonal and spatial protective stipulations are currently applied around identified nest sites and communal roost areas from human disturbance and industrial activities.

Management challenges for neotropical migrants include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, contaminants, agricultural practices), water level fluctuations, water quality, lack of cottonwood regeneration, snag removal in preferred habitats, collision with wind turbines and powerlines, and interspecific competition for nest sites.

General management actions should maintain the presence of neotropical migrants and their preferred nesting and foraging habitats. Management actions should focus on maintaining or increasing the viability and biological integrity of special status species habitats within the planning area.

Management challenges for special status mammals include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, use of contaminants, cave closures, animal damage control practices), lack of cottonwood and willow regeneration, collision with wind turbines (for bats), and snag removal in preferred habitats. General management actions are intended to maintain and enhance the presence of nongame mammals and the habitats on which they depend.

Management challenges for amphibians include habitat degradation, land conversion, incompatible land uses (e.g., contaminants, conversion or degradation of aquatic habitats) and degradation of water quantity and quality.

3.4.9 Invasive Nonnative Species

The proliferation of INNS, including invasive nonnative plant species, as well as other organisms, such as insects, mammals, and pathogens, contributes to loss of rangeland productivity, reduced water availability, reduced structural and species diversity, loss of wildlife habitats, and, in some instances, is hazardous to human health and welfare. INNS control on federal lands is regulated by federal and state laws. In accordance with these policies, the BLM works cooperatively with the State of Wyoming and the Lincoln and Uinta County Weed Control districts through a cooperative weed and pest management program to preserve and enhance all resources within the planning area.

INNS include plant species that are invasive and not indigenous to the planning area. Invasive plant species listed by the State of Wyoming and weed control districts are termed “noxious.” Noxious weeds are undesirable plants that infest either land or water resources and may cause economic damage or have other adverse impacts on humans. Noxious weeds are designated and regulated by state and federal laws, including the Federal Noxious Weed Act, because they are detrimental to agriculture, commerce, and (or) public health (BLM 2005h). In addition to plants, other pests classified as INNS include any biological life form that poses a threat to human or ecological health and welfare.

INNS within the Planning Area

There are 25 designated and prohibited noxious weeds on the State of Wyoming Weed and Pest Control Act Designated List (Wyoming Weed and Pest Council 2007) (see Table 3-22). Six other INNS are included on the Wyoming Weed and Pest Control Act Designated Pests List (Table 3-23). The INNS in Table 3-24 represent the Declared List of Weeds and Pests in accordance with the Wyoming Weed and Pest Control Act of 1973 for Lincoln and Uinta counties. As new weed species or pests are discovered within the planning area, they will be added to the appropriate list and control measures will be taken.

Several INNS pests and pathogens presently are associated with the forestlands in the planning area, including dwarf mistletoe and mountain pine beetle in the lodgepole pine component, western balsam bark beetle and root diseases in subalpine fir, and Douglas-fir bark beetle and root diseases in the Douglas-fir component. Epidemic levels of mountain pine beetle can be found on the lower east slope of commissary ridge in the Bartlett Creek area and on Dempsey Ridge just north of Coke Mountain. Subalpine forests are in a widespread general decline throughout their range as a result of the western balsam bark beetle and various root diseases (Schiche 2003).

INNS likely originated from Europe and Eurasia as ornamental plants for gardens and, thus, have established themselves with no natural enemies to control them. When surface disturbance occurs in areas where INNS already exist and the disturbed area is not properly managed to allow native vegetation to establish, INNS species will fill the void. Historical INNS infestations likely began as small patches in disturbed areas resulting from development, fire, roadway and utility corridors, grazing animal concentration areas, recreation, or OHV trails. The USGS (2003b) identifies fire and grazing as important disturbance factors that promote INNS spreading. Although data are not available, the spread of initial infestations are thought to have occurred through the transport of seeds or other propagates by wildlife, livestock, vehicles, people, water, or wind to disturbed areas. Disturbed areas are more frequent and vegetation is more fragmented along the southeastern and central portion of Wyoming, where historical land uses have included grazing, agriculture, and mineral development (Mac et al. 1998). Actions resulting in removal of vegetation or damage to soils, such as those associated with transportation, oilfield operation, mining, recreation, OHV use, fire, utility corridors, crop production, range improvements, and livestock and wildlife grazing have exposed or altered the soil to create habitats conducive to the spread of INNS. These disturbances, combined with periodic extremes in the climate regime, resulted in changes in plant composition, decreased native diversity, and increased fragmentation (Noss 1987).

An area of concern in the management of natural resources is the departure from historical fire regimes. In recent years, the severity and intensity of wildfires in the west have increased dramatically from levels in the 1970s and 1980s. Activities contributing to this change in fire regime include fire exclusion, forest management, livestock grazing, establishment of INNS (including invasive plant species and introduced insects or disease), or other management activities. The result is a change in key ecosystem components, such as species composition, structural state, stand age, canopy closure, and fuel loading (BLM 2005h).

Nonnative annual grasses (particularly cheatgrass and Japanese brome) are invading grassland, sagebrush grassland, mixed grass prairie, desert-shrub, and mountain-shrub communities (Mac et al. 1998). While not currently listed by the State of Wyoming as noxious weeds, nonnative annual grasses can spread into undisturbed natural areas and reduce the fire-return interval sufficiently to eliminate shrubs and change species composition of sagebrush communities. Annual grasses are spreading rapidly into grassland and shrubland communities in Wyoming; however, the distribution and rate of spread of nonnative grasses in the planning area are not currently being documented.

Saltcedar (tamarisk), is another example of a plant INNS that alters the natural ecosystem. Saltcedar is a nonnative tree or shrub invading riparian and wetland areas and out-competes native vegetation by utilizing its much deeper root system (up to 100-feet deep) to inhabit a larger area further from streams and open water bodies than native riparian vegetation (TC 2003). Once established, saltcedar changes

soil chemistry, depletes soil nutrients and water, and increases salinity, thereby reducing the potential for and recovery of native plant species. Mapping the distribution of saltcedar in the planning area is ongoing.

Table 3-22. Wyoming Weed and Pest Control Act Designated Noxious and Prohibited Weeds

Common Name
Field bindweed
Canada thistle
Leafy spurge
Perennial sowthistle
Quackgrass
Hoary cress (whitetop)
Perennial pepperweed (giant whitetop)
Ox-eye daisy
Skeletonleaf bursage
Russian knapweed
Yellow toadflax
Dalmatian toadflax
Scotch thistle
Musk thistle
Common burdock
Plumeless thistle
Dyers wode
Houndstongue
Spotted knapweed
Diffuse knapweed
Purple loosestrife
Saltcedar
Common St. Johnswort
Common tansy
Russian olive

Source: Wyoming Weed and Pest Council 2007. Designated Noxious Weeds W.S. 11-5-102 (a)(xi) and Prohibited Noxious Weeds W.S. 11-12-104.

Table 3-23. Wyoming Weed and Pest Control Act Designated Pests

Common Name
Grasshoppers
Mormon crickets
Prairie dogs[1]
Ground squirrels
Mountain pine beetle
Beet leafhopper

Source: Wyoming Weed and Pest Council 2005b. Designated Pests W.S. 11-5-102 (a)(xii).
[1]Prairie dogs are currently addressed as a special status species; refer to the Special Status Species section of this document for more information on prairie dogs.

Table 3-24. Declared List of Weeds and Pests by Counties in the Kemmerer Planning Area for 2006

County	Common Name
Lincoln County	Wild oats
	Cattle Grub
	Alfalfa weevil
	Mosquito
	Plains pocket gopher
Uinta County	Black henbane
	Yellow star thistle
	Mosquito

Source: Wyoming Weed and Pest Council 2006

Although applying pest-control measures has been limited until this time, it is reasonable to conjecture that issues such as the West Nile virus, bird flu, other invasive and noxious weeds, nonnative animals, tree pathogens, may need to be addressed in the foreseeable future. APHIS is currently the BLM's agent for controlling animal pests.

INNS Management in the Planning Area

INNS are not restricted by legal and administrative boundaries. To be effective, federal, state, county, and private interests must work collaboratively. The Kemmerer Field Office manages INNS species in the planning area by implementing management actions consistent with the goals included in the Partners Against Weeds (BLM 1996). The Kemmerer Field Office is currently involved in three Noxious Weed Coordinated Resource Management working groups within Lincoln and Uinta counties. The Bear River Divide Weed Management Area includes both Lincoln and Uinta counties and covers most of the Cumberland and Uinta allotments (approximately 400,000 acres). The Highlands Cooperative Weed Management Area includes the portion west of Lincoln County not included in the Bear River Divide Weed Management Area. The Four Rivers Cooperative Weed Management Area covers the remaining portion of Uinta County not covered in the Bear River Divide Cooperative Weed Management Area. All the area with the planning area is covered under a Weed Management Plan. Numerous educational programs have been implemented to make the public aware of weeds, such as education days at schools, essay contests for students, and scheduled weed workdays with federal and state agencies and the public. In addition, in November 2005 the BLM issued the *Draft Programmatic Environmental Impact Statement for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM 2005i) to analyze the use of herbicides on the human and natural environment.

Infestations of INNS spread sporadically throughout the planning area. Plant INNS (weeds) are a high priority for control and management because they contribute to the loss of rangeland productivity, increased soil erosion, reduced water quantity and quality, reduced species diversity, and loss of wildlife habitats. The Kemmerer Field Office treats an average of 1,000 acres of various weed species each year. The BLM uses an integrated weed management program that involves grazing, fire management, chemical, mechanical, and biological controls (BLM 1990a; BLM 1992d).

Current biocontrol agents in Lincoln and Uinta counties include insects that target musk thistle and Dalmatian toadflax. Other biocontrol agents that may be introduced in the future include two species that target salt cedar and one species that targets Canada thistle; however, these are in an experimental stage and have not been approved for general release.

The weed program is continually growing as a result of changing priorities, new INNS introductions, discovery of new infestations, and the rapid growth of known infestations. Geographic Information

System (GIS) mapping of weed locations is ongoing to determine locations of known weeds, as well as to locate new infestations.

Management challenges for INNS include managing BLM-authorized activities in the planning area that disturb the soil or otherwise create an opportunity for the establishment of INNS; educating resource users regarding the spread, early detection, rapid response, and control of INNS; and determining effectiveness of INNS control without a current INNS inventory and comprehensive INNS management program. These challenges require coordination across all BLM's resource programs to develop, integrate, and implement aggressive management techniques and strategies for controlling the adverse impacts and spread of INNS throughout BLM lands, including the planning area. Management actions identified in the alternatives described in Chapter 2 are designed to address INNS challenges in the planning area.

3.5 Heritage Resources

Heritage Resources include the individual resources of cultural, paleontological, and tribal treaty rights. Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions.

3.5.1 Cultural Resources

3.5.1.1 Archeology and Historic Resources

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. Cultural resources include archeological resources, historic architectural and engineering resources, and traditional resources. Archeological resources are areas where prehistoric or historic activity measurably altered the earth or where deposits of physical remains (e.g., arrowheads, pottery, bottles) are discovered. Architectural and engineering resources include standing buildings, districts, bridges, dams, and other structures of historic or aesthetic significance. Traditional resources can include archeological resources, structures, topographic features, habitats, plants, wildlife, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

Identified Cultural Resources

Cultural resources investigations began in the Kemmerer Planning Area in 1967. Most investigations have been accomplished pursuant to compliance with Section 106 of the National Historic Preservation Act (NHPA) and provisions of NEPA, both of which require federal agencies to consider potential effects of federally assisted or permitted undertakings on cultural resources eligible for or listed on the National Register of Historic Places (NRHP). Cultural resources investigations in the Kemmerer Planning Area have also been conducted by the BLM pursuant to the BLM's stewardship responsibilities under Section 110 of the NHPA, which requires federal land-managing agencies to identify and manage significant cultural resources on lands administered by those agencies. From 1967 to 2003, approximately 4,400 cultural resources investigations were conducted within the Kemmerer Planning Area (BLM 2004c). Surveys have been conducted on more than 192,000 acres, about 4.8 percent of the planning area. These investigations have included inventory, project monitoring, site testing, evaluation of eligibility for nomination to the NRHP, and mitigation of potential adverse effects through data recovery and other documentation. Most recently, the BLM completed a Class I Regional Overview of the planning area that reviewed and summarized past cultural resources investigations, the numbers and kinds of recorded resources, and cultural resources management directions (BLM 2004c). The information in this section was prepared primarily using the Class I Overview.

The planning area defines four categories of cultural resources: (1) prehistoric sites, which include prehistoric landscapes; (2) historic sites, which include archeological sites, standing structures, roads, and historic landscapes; (3) historic trails, which include pioneer burials, emigrant campsites, pioneer inscription sites, river crossings, forts, Pony Express and stage stations, natural landmarks, and historic landscapes; and (4) Native American culturally sensitive sites (e.g., Traditional Cultural Properties [TCPs]) (BLM 2003a).

Investigations to date have recorded more than 8,400 cultural resources within the planning area (BLM 2004c). More than 95 percent of the 6,766-recorded Native American sites are campsites or habitations, lithic scatters, or secondary lithic procurement sites. Other site types include burials, ceremonial stone alignments, rock art, rock shelters, ceramic-bearing sites, quarries/primary lithic procurement sites, hunting blinds, house pit features, and bison kill and butchering sites (BLM 2004c). A total of 1,656 historic-era sites have been recorded in the planning area. Euro American or other historic sites include emigrant trails, freight wagon and stagecoach trails, military camp and fort sites, an early highway, early ranches and farms, stock-herding camps, irrigation systems, coal mines, early oil fields, railroads, bridges,

historic landscapes, and urban buildings (BLM 2004c). This section summarizes the numbers and kinds of identified cultural resources in the planning area by subregion (see Map 27).

Bear River Divide Subregion. This subregion includes approximately 48,000 acres, 12.4 percent of which has been surveyed for cultural resources. Investigations have generally identified low cultural resource densities. Thirty-nine cultural resources have been documented (24 Native American and 15 Euro American or other historic). The majority of the Native American sites are classified as lithic scatters and campsites. One site with stone circles has been identified. The Hams Fork Conglomerate Archeological Landscape is located in this subregion. Among the Euro American or other historic sites, stock herding is the dominant theme. Several variants of the Oregon-California National Historic Trail (NHT) cross this subregion (BLM 2004c).

Bear River Valley Subregion. This subregion includes approximately 276,480 acres, 4.15 percent of which has been surveyed for cultural resources. A total of 230 cultural resources have been documented (95 being Native American and 135 Euro American or other historic). The majority of the Native American sites are classified as lithic scatters, along with campsites, quarries, and one rock shelter. Notable archeological sites include the Weston and Bessie Bottom sites. Among the Euro American or other historic sites, transportation sites dominate, including the original routes of the Union Pacific Transcontinental Railroad and the Union Pacific Oregon Short Line Railroad. Other site types include irrigation features and reservoirs, homesteads/ranches, urban buildings, and stock-herding sites. The Oregon-California NHT and the Mormon Pioneer-California NHT cross this subregion (BLM 2004c).

Bridger Valley Subregion. This subregion includes approximately 311,000 acres, 2.4 percent of which has been surveyed for cultural resources. A total of 681 cultural resources have been documented (536 Native American and 145 Euro American or other historic), and the subregion is considered to be relatively rich in cultural resources. The majority of Native American sites are campsites and lithic scatters. The Eakin site is a notable archeological property. This subregion also contains a concentration of historic sites that are significant in national and regional history, including the Oregon, California, Mormon Pioneer, and Pony Express NHTs; the Fort Bridger State Historic Site; the Fort Supply; features of Mormon agrarian development, such as homesteads, ranches and irrigation districts; and the Union Pacific Transcontinental Railroad (BLM 2004c) and the Lincoln Highway.

Green River Basin Subregion. This subregion covers approximately 934,400 acres, 5 percent of which has been surveyed for cultural resources. A total of 5,339 cultural resources have been documented (4,837 Native American and 502 Euro American or other historic), the highest numbers of sites among the subregions. The high densities of Native American camps, lithic scatters, and archeological landscapes reflect concentrated land use, in which occupants utilized a variety of critical resources throughout the basin for thousands of years (BLM 2004c). Notable sites include Austin Wash, Church Butte Four, Cow Hollow Creek, Dixie Cup, Disney, Fontenelle Twelve, Gateway Petroglyphs, Gemma, Hams Fork, MAK, Moxa Twenty-eight, Moxa Housepit, Old-and-in-the-way, Pescadero, Porter Hollow, Sevenmile Wash, Shute Creek Plant, Taliaferro, and the Vegan sites. Significant historic roads and trails passing through this area include the Oregon, California, Mormon Pioneer, and Pony Express NHTs, the Union Pacific Transcontinental Railroad, the Oregon Short Line Railroad, the Lincoln Highway, the Opal Wagon Road, and the Bryan to South Pass City Road (BLM 2004c).

Overthrust Belt Subregion. This subregion covers approximately 869,000 acres, 6 percent of which has been surveyed for cultural resources. A total of 749 cultural resources have been documented (459 Native American and 290 Euro American or other historic). Overall site densities are generally low throughout the area due to the steep terrain with limited habitable contexts (BLM 2004c). Among the Euro American or other historic sites, stock herding is the dominant theme. The majority of the Native American sites are classified as lithic scatters and campsites. The Sublette and Dempsey-Hockaday Cutoffs of the Oregon-California NHT cross this subregion, as do the major variants of the Oregon,

California, Mormon Pioneer, and Pony Express NHTs. The Union Pacific Transcontinental and Oregon Short Line railroads, and the Lincoln Highway also cross the subregion (BLM 2004c).

Overthrust Foothills Subregion. This subregion includes approximately 514,560 acres, 8.6 percent of which has been surveyed for cultural resources. A total of 1,165 cultural resources have been documented (705 Native American and 460 Euro American or other historic). This subregion contains the greatest diversity of site types and periods of occupation. Notable archeological sites include Broken Home, Deep Hearth, Meadow Draw Ten, Meadow Draw Thirteen, Oyster Ridge, Skull Point, South Slate Creek, and Wishful sites. The Bridger Antelope Trap, an NRHP-listed game drive and trap, is also located in this subregion. All but one of the NHTs pass through this subregion, as do the Union Pacific Transcontinental and Oregon Short Line railroads, and the Lincoln Highway. Most of the many historic coal mines in the planning area are also located in this subregion, as are the historic Piedmont charcoal kilns and town (BLM 2004c).

Star Valley Subregion. This subregion includes approximately 105,600 acres, less than 1 percent of which has been surveyed for cultural resources. A total of 22 cultural resources have been documented, all Euro American historic. One significant cultural property is known in the subregion: Lander's Cutoff of the Oregon Trail crosses private land in Star Valley (BLM 2004j).

Uinta Foothills Subregion. This subregion covers approximately 134,400 acres, 4.2 percent of which has been surveyed for cultural resources. Most of the inventories were conducted in the eastern one-third of this subregion as a result of gas development in the last two decades of the twentieth century. A total of 60 cultural resources have been documented (35 Native American and 25 Euro American or other historic). The majority of the Native American sites are classified as lithic scatters. Among the historic sites, homesteading and ranching are the dominant themes (BLM 2004c).

Wyoming Range Subregion. This subregion covers approximately 860,800 acres, 4.5 percent of which has been surveyed for cultural resources. A total of 137 cultural resources have been documented (75 Native American and 62 Euro American or other historic). The majority of the Native American sites are classified as campsites and lithic scatters. Among the Euro American or other historic sites, homesteading and ranching are the dominant themes. The Sublette and Dempsey-Hockaday Cutoffs of the Oregon-California NHT pass through the southern tip of the subregion on BLM and private lands (BLM 2004c).

Management challenges for cultural resources in the planning area include continued identification and evaluation of National Register eligibility of archeological sites; mitigation of adverse effects due to resource development; addressing cumulative and indirect effects from resource use; balancing resource protection with demands on the resource from multiple use; identification and protection of TCPs; implementation of important management tools, including the cultural resources database and digitization of cultural resource basemaps into GIS; the ability to conduct cultural resource inventories above and beyond those required under Section 106; and striving for consistency with adjacent and overlapping land management plans (BLM 2003a).

The BLM national management objectives are expressed in *BLM Manual 8100, Cultural Resource Management*, as follows:

- Identify, plan the appropriate use of, and manage cultural resources on public lands and in areas of BLM responsibility.
- Respond in a legally and professionally adequate manner to (1) the statutory authorities concerning historic preservation and cultural resource protection, and (2) the principles of multiple use and ecosystem management.
- Recognize the potential public and scientific uses of, and the values attributed to, cultural resources on the public lands, and manage the lands and cultural resources so that these uses and values are not diminished, but rather are maintained and enhanced.

- Contribute to land use planning and the multiple use management of the public lands in ways that make optimum use of the thousands of years of land use history inherent in cultural resource information, and that safeguard opportunities for attaining appropriate uses of cultural resources.
- Protect and preserve in place representative examples of the full array of cultural resources on public lands for the benefit of scientific and public use by present and future generations.
- Ensure that proposed land uses, initiated or authorized by BLM, avoid inadvertent damage to federal and nonfederal cultural resources.

In addition, specific objectives recently were expressed in BLM Information Bulletin No. 2002-101, *Cultural Resource Considerations in Resource Management Plans,* which states that all RMPs will include at least the following two goals (BLM 1986a):

- Preserve and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations.
- Imminent threats from natural or human-caused deterioration, or potential conflict with other resources uses, are reduced by identifying priority geographic areas for new field inventory, based upon a probability for unrecorded significant resources.

The first goal requires resource use allocation decisions in the RMP in which all cultural properties in the planning area must be allocated to the following uses according to their nature and relative preservation value (BLM 1998c):

- Scientific Use - preserved until research potential is realized.
- Conservation for Future Use - preserved until conditions for use are met.
- Traditional Use - long-term preservation.
- Public Use - long-term preservation and on-site interpretation.
- Experimental Use - protected until used.
- Discharged from Management - no use after recordation and not preserved.

The second goal requires a Class I regional overview of the planning area to identify priority areas in need of new field inventory where unrecorded significant resources could be found. A Class I regional overview is a professionally prepared study that includes a compilation and analysis of all reasonable available cultural resource data and literature; a management-focused, interpretive, narrative overview; and synthesis of the data.

According to the management objectives of the existing RMP (BLM 1986a), the BLM plans to continue to identify, protect, manage, and enhance cultural resources located on its lands or on nonfederal lands that may be affected by BLM undertakings. The *Kemmerer Resource Management Plan* (BLM 1986a) provides the following general direction:

- All historical, archeological, and cultural sites eligible for or listed on the NRHP are protected or mitigated.
- The need for cultural resource management plans for specific resources is determined on a case-by-case basis.
- NSO for fluid minerals is designated for the NRHP-listed Bridger Antelope Trap.

Native American Concerns

Native American traditional resources include TCPs, traditional resources that are eligible for the NRHP, and sites of cultural concern that are not eligible for the NRHP, but identified as significant by Native American groups and may be protected under the American Indian Religious Freedom Act (AIRFA). In

general, Native American traditional resources can include archeological sites; stone alignments; petroglyphs and pictographs; plant, animal, and lithic resource collection areas; spiritual locations; and other traditional use locations that may have spiritual or other cultural meaning to Native Americans. The locations of many such traditional resources are considered confidential and are not released to the public to protect the resources. When a specific management need arises that concerns a traditional cultural resource or site of cultural concern, the BLM consults with one or more of the following tribes, as appropriate.

- Eastern Shoshone (Wyoming)
- Northern Arapaho (Wyoming)
- Shoshone Bannock (Idaho)
- Northern Ute (Utah)

3.5.1.2 National Historic Trails

In 1968, the National Trails System Act provided for the development of a national system of trails in urban, rural, and wilderness settings. Originally, the Act specified three categories of national trails: scenic trails, recreation trails, and connecting or side trails. In 1978, historic trails were added as another category. Today, only Congress may establish NHTs. In 1995, the NPS established the National Trails Office in Salt Lake City, Utah. In 2006, the name was changed to the National Trails System Office which administers the Oregon, the California, the Mormon-Pioneer and the Pony Express NHTs. However, the National Trails System Office does not manage trail resources on a day-to-day basis. The responsibility for managing trail resources remains in the hands of the current trail managers at the federal, state, local and private levels.

There are segments of four NHTs within the planning area, as well as associated cultural resource sites. The four trails are sometimes referred to collectively as the "Oregon-California-Mormon Pioneer-Pony Express Trail" because their routes overlap in many areas. In the planning area, the corridor divides with individual routes and cutoffs leading west, northwest, and southwest through Sweetwater, Lincoln, and Uinta counties. Long stretches of the primary trail routes and major trail alternatives are on public lands. Conditions of the trails range from highly visible, well-developed ruts, to areas where the trail is no longer locatable. The trail setting has varying degrees of historic integrity. Some trail segments have been covered by modern roadways. NHTs in the planning area are visited by both intentional and incidental tourists. Portions of the trails can be explored from the comfort of cars and paved surfaces, by hiking, and by horseback. Map 28 depicts the routes of the trails within the planning area.

All variants of NHTs in the planning area are previously evaluated eligible to the NRHP under Criterion A, because they are associated with events that made a significant contribution to broad patterns of American history. The NHT variants in the planning area are composed of the physical traces left by wagons, the scenery visible from the trails, associated sites such as emigrant camps and graves and locations where important events were documented, and landmarks used by emigrants to navigate along the trails. Their quality of significance in American history is present in segments and sites that possess integrity of location, design, setting, materials, workmanship, feeling, and association. As a result of previous cultural investigations and BLM aerial reconnaissance from helicopter flights, all of the NHT variants in the planning area have been assessed in terms of their conditions that reflect qualities of integrity. Defined segments are classified for high, moderate, and low management levels appropriate to their conditions and degrees of integrity, as specified below.

The Kemmerer Field Office defines high management segments are those that retain excellent integrity of location, design, setting, feeling and association, because their physical traces remain in their historically documented locations. The form, structure, and style of wagon ruts reflect integrity of design, and their settings contain no dominant modern developments so they convey a sense of their historic period of use

and impart a direct link to the historic event. Management objectives are designed to protect the physical trail traces, associated sites and landmarks from adverse effects, and to preserve the settings to retain their integrity at distances up to 3 miles on each side of the trails. Specific projects must consider effects in trail settings that retain their historic integrity beyond the distances specified in the management objectives of the Preferred Alternative.

Moderate management segments are those that retain good integrity of location and design because their physical traces are present, but their integrity of setting, feeling, and association is fair because modern developments are visible from the trails. Management objectives are designed to protect the physical trail traces, associated sites and landmarks from adverse effects, and to preserve the settings to retain their integrity at distances up to ½ mile on each side of the trails.

Low management segments are those that retain some integrity of location and design in fair-to-poor conditions or their physical traces are destroyed and they lack integrity of setting, feeling and association because many modern developments are highly visible from segments where trails traces are present. Where trail traces are destroyed, none of the qualities of integrity are relevant. Management objectives are designed to protect only the physical trail traces, associated sites, and landmarks from adverse effects. No special management is proposed for destroyed trail segments.

Historic trails are among the most difficult resources to manage because of "their varying degrees of preservation and diverse range of environmental settings" (BLM 1986a). The BLM's management guidelines specifically focus on (1) historical significance and use, (2) the integrity of setting of the trail segment, and (3) the physical integrity of the trail ruts and swales.

Management actions for NHTs generally address management of trails for long-term heritage and educational values, reducing imminent threats from natural or human-caused deterioration, and reduction of conflicts with other resource uses.

Trails are protected from visual intrusion and surface disturbance to maintain the integrity of setting. Generally, visual intrusion and surface disturbance are restricted or prohibited within 1,320 feet of either side of a historic trail (depending on topography and surface disturbance) or within the visual horizon of the trail, whichever is closer (BLM 1986a).

The *Oregon/Mormon Pioneer National Historic Trails Management Plan* was prepared in 1986 to guide BLM management of the NHTs (BLM 1986b). To meet the objectives of the plan, protective measures have been prescribed within individual BLM districts for sites and segments on public lands (BLM 1986b). Specific BLM management responsibilities currently include the following (BLM 1986b).

- Regularly monitor the status of all Wyoming sites and segments identified in the comprehensive plan to identify changes in ownership or impending developments; keep the NPS informed.
- Arrange to have inventories and studies performed; seek public access; define boundaries; erect and maintain trail markers; provide and maintain local facilities; issue and enforce regulations; work closely with the NPS, and other public or private interest groups; and nominate qualified sites to the NRHP.
- BLM managers are directed to maintain the scenic/historic integrity of historic sites and cross-country segments on public lands, to avoid destruction of trail resources, to mitigate unavoidable impacts, to accord the trails a priority status in the land use planning process, and generally extend to the trails the type of protection afforded to other nationally significant historic sites.

BLM Manual 8110, *Identifying Cultural Resources*, defines six use categories for cultural resources, including historic trails, scientific use, conservation for future use, traditional use, public use, experimental use, and discharged from management. A cultural property may be allocated to more than

one use category, and allocations are revised when circumstances change or when new data become available (BLM 1998c). Of specific interest for NHTs are the categories of traditional use and public use:

- **Traditional Use**. This category refers to use of the cultural resource itself. Traditional use properties are critical to a community's beliefs, customs, and practices. The regulatory threshold for management of a property for Traditional Use is eligibility for the NRHP. In Wyoming, these kinds of resources are most commonly associated with Native Americans, although certain locations along the Mormon Pioneer NHTs also may be considered traditional resources.
- **Public Use**. Long-term preservation and onsite interpretation are most appropriate for cultural resources that have visually obvious manifestations of the site's historical or archeological importance. Examples of these resource types are well-defined wagon ruts and marked graves on the NHTs, and the features at Fort Laramie National Historic Site in eastern Wyoming

3.5.1.3 Oregon National Historic Trail

From 1843 to 1868, some 350,000 Euro American emigrants followed the Oregon Trail westward to Oregon, California, and Utah. Farmers bound for the valleys of Oregon, Mormons seeking religious freedom in the Salt Lake Valley, and miners all used the Oregon Trail. The route was later used by religious missionaries, the Pony Express, the federal Overland Mail service, and the first transcontinental telegraph.

The Oregon Trail was used by fur trappers and traders who followed well-worn Native American trails. To exploit the rich fur country of the Pacific Northwest, the American Fur Company established a trading post in Astoria near the mouth of the Columbia River in 1810. Wilson Price Hunt led the company's first overland expedition in 1811, crossing the Wind River Range through Union Pass and the Rocky Mountains via Teton Pass. His party then followed the Snake and Columbia rivers to Astoria. Robert Stuart led the company's return expedition in 1812, following the same water route and pass through the Rockies, crossing the Wind River Mountains via South Pass. From there he continued east along the Sweetwater and North Platte rivers, traveling west to east along an extensive portion of what would become the Oregon Trail (BLM 2004c).

South Pass was rediscovered in 1824 by a party of trappers, led by Jedediah Smith, looking for a westward crossing of the Wind River Range. The pass was thereafter commonly used and became well known to the public. In 1830, David E. Jackson and William L. Sublette led a caravan of wagons loaded with trade goods along the eastern portion of the Oregon Trail as far as South Pass. In 1832, Captain Benjamin L.E. Bonneville took the first wagons across South Pass and into the Green River basin. These expeditions demonstrated that the Oregon Trail could accommodate wagon traffic. In the coming decades, thousands of emigrant wagons journeyed westward through South Pass (BLM 2004c).

The Bidwell-Bartleson party (1841) usually is credited as the first group of emigrants to traverse the entire Oregon Trail, although it abandoned its wagons at Fort Hall, Idaho, and completed the journey with pack animals. In that same year, John C. Fremont traveled an extensive portion of the emigrant road, and later published the first accurate map and guidebook for travelers. In 1843, the first large party of Oregon-bound emigrants—135 men, 130 women, and 610 children—rolled westward from Independence, Missouri. Many historians use the year 1843 to formally mark the beginning of the great westward migration (BLM 2004c).

In 1846, Oregon became a territory of the United States. By that time, a considerable number of Euro Americans had already settled there, tipping the balance for United States acquisition. Prior to the California Gold Rush of 1849, more than 12,000 emigrants used the Oregon Trail (BLM 2004c). After the 1849 discovery of gold in California, the number of emigrants jumped to as many as 30,000 that year and to 55,000 in 1850. By 1852, gold rush traffic had ebbed, and most emigrants headed for Oregon (BLM 2004c). Moderate use of the Oregon Trail continued throughout the 1850s and 1860s. Later, gold

strikes in Colorado created a peak year in 1859, with 30,000 emigrants using the trail. Traffic subsided during the Civil War, but gradually increased to 25,000 in 1865/1866 (BLM 2004c).

Trail historians generally use the year 1869 to mark the end of traditional covered wagon migration, as well as the pre-settlement period throughout the Oregon Trail corridor. With the completion of the transcontinental railroad in that year and the beginning of the settlement of the intervening territories, the character of western emigration changed. However, wagon travel by emigrants who could not afford rail or stage transportation and those traveling shorter distances between or within territories continued (BLM 2004c).

Fort Bridger, 1842 – 1890. Jim Bridger and Louis Vasquez constructed Fort Bridger in 1842 and 1843 as a trading post. Ten years later the post was seized by the Mormons and occupied until the Mormon War of 1857, when the Mormons abandoned and burned the post. In 1858, the remnants of the fort became a United States military installation that remained in service until 1890. Between Fort Laramie and Fort Bridger, emigrants had two major supply points along the Oregon Trail in present-day Wyoming as well as additional protection from patrolling soldiers. Today Fort Bridger is a Wyoming State Historic Site and is listed on the NRHP.

Bear River Divide, 1843 – 1868. Euro American interest in the Bear River Divide dates to the 1820s when mountain men blazed their trails through the region. John Charles Fremont visited the area in 1843 and his expedition produced the first map showing the Bear River Divide. Within a few decades, emigrant wagons followed the route. The Bear River Divide portion of the Oregon Trail is considered to be the primary route of the Oregon Trail as it approaches the Utah state line between Fort Bridger, Wyoming, and Fort Hall, Idaho (BLM 2004c). After stocking up on supplies at Fort Bridger, most emigrants bound for Oregon took the Bear River Divide route. The trail ascended the divide from the east by one of three routes. Little Muddy Creek led westward to the mouth of Chicken Creek, and on to the top of the Divide. Variations included Road Hollow, Little Muddy, Divide Segment, North Bridger Creek, and South Bridger Creek (BLM 2004c). At least some of the California gold rush travelers of 1849 and the early 1850s also used the Bear River Divide. Today, good physical remnants still exist along the trail.

Lander Cutoff, 1857 – 1868. The Lander Cutoff was one of the last east-to-west emigrant trails to be established. It was surveyed and built in 1857/1858 by engineer Frederick W. Lander for the Department of the Interior. It is the only stretch of the Oregon Trail system to be subsidized and constructed by the federal government (BLM 2004j). This cutoff sought to speed mail delivery to the West Coast and provide safer and easier roads for emigrants (BLM 2004c). What became the Lander Cutoff was actually the central division of a wagon road stretching from Fort Kearny, Nebraska, to Honey Lake, California. This route avoided a long desert crossing and alkaline water, and afforded better forage and wood than existing routes. The new road angled northwest along the base of the Wind River Range from South Pass, then bore westerly across the New Fork River and Green River, followed South Piney Creek, and crossed the Wyoming Range via Thompson Pass and the Salt Range via Wagner Pass. It then turned north through Star Valley and continued westward to Fort Hall, Idaho. When completed, the Lander Cutoff was approximately 345 miles long and connected Gilbert Station at South Pass to City of Rocks, a point west of Fort Hall near the present Idaho-Utah border. Traffic increased in 1859 due to the Colorado gold rush, although westbound travelers would have diverged southward to Colorado before reaching the Lander Cutoff. The last recorded sighting of a westbound emigrant train on the Lander Cutoff was in 1912 (BLM 2004c). Today, the route is well marked in most places. The BLM and the USFS-managed lands predominate with public roads following much of the route (BLM 2004j).

Sublette Cutoff, 1841 – 1868. The Sublette Cutoff provided a shorter alternative to the Lander Cutoff and the main trail past Fort Bridger. The cutoff paralleled the present-day Sweetwater-Sublette county line on the Sweetwater side, then turned southwest and descended to the Green River south of LaBarge. The Stephens-Townsend-Murphy party crossed the route in 1844, although inscriptions at Names Hill, located along the Cutoff, indicate that it was probably used by the early fur trappers in the 1820s and

1830s. The first years of the California gold rush were the high mark for emigrant use of the Sublette Cutoff. In 1849, an estimated 65 percent of the travelers used this route, and by 1850, an estimated 9 of every 11 teams chose the Sublette Cutoff (BLM 2004c). At one time it became the main variation of the Oregon Trail west of South Pass. By 1848, Mormons had established ferries on the Green River, indicating sufficient traffic to make this venture worthwhile. From the Green River, the emigrants could then choose the more northerly Dempsey-Hockaday Cutoff or continue on the main Sublette Cutoff, which crossed Hams Fork, then crossed over a series of steep ridges before descending into the Bear River Valley, where it joined the road between Fort Bridger and Fort Hall. The Sublette Cutoff was later eclipsed by other routes to the south and gradually fell into disuse, except for local and regional traffic in the late nineteenth and early twentieth centuries (BLM 2004c). Today, the Sublette Cutoff is well-marked and crosses BLM-managed public lands for much of its distance (BLM 2004l).

Slate Creek and Dempsey-Hockaday Cutoffs, 1851 – 1868. The Slate Creek Cutoff was one of the southerly shortcuts on the Sublette Cutoff. It was located between the Big Sandy River on the east and the Green River on the west. Many nineteenth century emigrants chose these shortcuts to avoid the almost 50-mile desert crossing of the Sublette Cutoff to the north. The Slate Creek Cutoff diverged from Big Timber Station on the main Oregon Trail and followed the Slate Creek drainages joining the main Sublette Cutoff on Slate Creek Ridge and at Rocky Gap on Oyster Ridge north of Kemmerer. The Slate Creek Cutoff was utilized mostly between 1852 and 1859, when the Lander Cutoff diverted much of the emigrant traffic. Emigrant Springs was an important stop along the Slate Creek Trail and is listed on the NRHP. This area was heavily used as a rest stop and campsite for travelers (WYSHPO 2004a). Emigrant Springs and Johnston Scout Rocks, another NRHP-listed site just south of Emigrant Springs, are registers for early travelers whose inscriptions date from 1850 to 1888. The name of the Johnston Scout Rocks derives from the inscription, “T.C. Johnston” and “1860 Scouts” (WYSHPO 2004b). By the early 1890s, more than 30 years had passed since the Slate Creek Cutoff was used as an emigrant route, and the area was being settled by ranchers dependent on Opal, the nearest railhead to the south (BLM 2004c).

The Dempsey-Hockaday trail was a shortcut on the Sublette Cutoff in Lincoln County northwest of Kemmerer. In 1854, John Hockaday discovered this 16.7-mile route across the Bear River Mountains. The trail crossed Commissary Ridge, Hams Fork Plateau, and then rejoined the Sublette Cutoff at the crest of Dempsey Ridge (BLM 2004c). Today, The Slate Creek and Dempsey-Hockaday cutoffs are primarily located on BLM-managed public lands, with occasional trail markings (BLM 2004m).

Hams Fork Cutoff, 1841 – 1868. This poorly documented cutoff was a well-watered route that diverged from the main Oregon Trail at Granger and followed the Hams Fork upstream in a northwesterly direction to the Sublette Cutoff. The route bypassed Fort Bridger (BLM 2004c). Today most of this route is paralleled by U.S. Route 30 between Granger and Kemmerer. The Hams Fork Cutoff is associated with the Mormon War of 1857-58, and several government expeditions of the USGS used portions of the route in the 1870s. The Oregon Short Line Railroad was built along this same route in 1881 and 1882 (BLM 2004c). Today, this trail is unmarked and located mostly on private lands (BLM 2004n).

Blacks Fork Cutoff, 1857 – 1858. The Blacks Fork Cutoff of the Oregon Trail is a poorly documented shortcut on the main Oregon Trail. The main trail headed southwest to Fort Bridger and then swung northwest before heading west out of present-day Wyoming. The Blacks Fork Cutoff proceeded due west from Granger, following a portion of the Blacks Fork River and the current Lincoln-Uinta county line. It rejoined the main trail east of Cumberland Gap. The Blacks Fork Cutoff may have been used extensively by Mormon emigrants during and after the Mormon War of 1857 to avoid federal troops (BLM 2004c). The prominent ruts and swales along its course indicate that the cutoff received heavy usage.

Today, the route of the Oregon Trail is well-marked by BLM concrete marker posts and by white carsonite stakes placed on private lands by the Oregon-California Trails Association. Automobile tour route signs are posted on public roads and highways paralleling the trail (BLM 2004o). Table 3-25 identifies NRHP-listed sites associated with the NHTs in the planning area.

Table 3-25. NRHP-Listed Sites Associated with National Historic Trails in the Kemmerer Planning Area

Site	County	Trail Association	Description
Emigrant Springs	Lincoln	Slate Creek Cutoff	Emigrant register and campsite on BLM land
Johnston Scout Rock	Lincoln	Slate Creek Cutoff	Emigrant register on BLM land
Fort Bridger	Uinta	Oregon Trail	Emigrant supply stop/military post on State land
Granger Stage Station	Sweetwater	Pony Express	Pony Express and stage station on State land

Source: NRIS 2004
NRHP National Register of Historic Places

3.5.1.4 California National Historic Trail

The California Trail, designated an NHT in 1992, carried more than 250,000 gold seekers and farmers to the gold fields and farmlands of California during the 1840s and 1850s. This was the greatest mass migration in American history (NPS 2004a). The California Trail system developed over a period of years, and numerous cutoffs and alternate routes were tried to locate the best terrain, the shortest length, and sufficient water and grass for livestock. The general route began along the Missouri River, but the specific route that emigrants and Forty-niners used depended on their starting point in Missouri, their final destination in California, the condition of their wagons and livestock, and yearly changes in water and forage along the different routes. During the Gold Rush years, most of the Forty-niners took any one of a series of shortcuts that bypassed the southern dog-leg of the original trails to Fort Bridger. Today, trail marking and land ownership patterns are the same as the Oregon and Mormon Pioneer trails (BLM 2004o).

3.5.1.5 Mormon Pioneer National Historic Trail

Roughly, 70,000 Mormons, led by Brigham Young, traveled along the Mormon Pioneer Trail from 1846 to 1869 to escape religious persecution (NPS 2004b). The general route from Nauvoo, Illinois, to Salt Lake City, Utah, covers about 1,300 miles. The Trail crosses five states over both public and private land. It was designated an NHT in 1978 (NPS 2004b).

Mormon emigrants, using wagons, handcarts, and traveling on foot, generally followed or paralleled the Oregon Trail for about 397 miles from Fort Laramie in eastern Wyoming to Fort Bridger in southwestern Wyoming. At Fort Bridger, where the Oregon Trail turned north, the Mormon trail left the Oregon Trail and used the Hastings Cutoff to reach the Salt Lake Valley of Utah. This route traveled around the south edge of the Great Salt Lake and over the Salt Desert. The ill-fated Donner Party pioneered the route in 1846. Mormons continued to use the cutoff until the 1869 completion of the transcontinental railroad.

Mormon emigrants established mileposts, toll ferry crossings, and camping spots along the trail; improved the road when necessary; and published the Latter Day Saints' Emigrants Guide, one of the earliest trail guides (BLM 2004c). As Mormon settlements gradually spread in all directions, including east into southwestern Wyoming, church members maintained ferry sites on the Green River crossings of the Oregon Trail (BLM 2004c). The Oregon Trail was also used as a major freight route to supply the growing Mormon settlements in Utah. As early as 1849, Ben Holladay began serious freighting on the Oregon Trail by taking 50 freight wagons to Salt Lake City and subsequently to California. The Mormons also developed their own freight lines after 1850 (BLM 2004c).

Today, the Mormon Pioneer Trail route through Wyoming is nearly identical to the Oregon Trail route from Fort Laramie to Fort Bridger. The same patterns of land ownership and trail markings apply to both trails (BLM 2004o).

3.5.1.6 Pony Express National Historic Trail

In 1850, the federal government began contract mail service to western settlements via the Oregon Trail. The contractors had mixed success due to harsh weather and Native American attacks. In 1860, the short-lived Pony Express was established; it operated for only 18 months. The Pony Express Trail was used by relay-riders on fast-paced horses to carry mail across the country from Missouri to California in only 10 days (NPS 2004c). Completion of a transcontinental telegraph system led to the abandonment of the Pony Express in 1861 (BLM 2004c). In 1862, regular stage stops were established along the Oregon Trail in present-day Wyoming, using most of the existing Pony Express and stage stations (BLM 2004c). The Pony Express Trail route follows the Oregon Trail route through eastern Wyoming and South Pass to Fort Bridger. From there it uses the Mormon Pioneer Trail into the Salt Lake valley. Today, the route is well marked, both on the actual trail and on nearby highways (BLM 2004o).

Hams Fork Station (South Bend Station/Granger Stage Station), listed on the NRHP, was established around 1856 near the confluence of the Hams Fork and Blacks Fork rivers. Throughout the 1860s there was considerable activity around Hams Fork Station, beginning with the operation of the Pony Express in 1860 and 1861. In 1862, the Overland Stage operation was changed from the South Pass route to a new line that rejoined the old original route at Hams Fork. At that time, the station became known as South Bend Station. The UPRR arrived at Hams Fork in 1868 and the old stage station became part of a rail camp and the rail station of Granger (WYSHPO 2004c).

3.5.2 Native American Concerns

Native Americans inhabited the planning area region for thousands of years before European contact. They used the region for hunting, fishing, and collecting plants, as well as for religious ceremonies and burial of the dead.

The lands managed by the Kemmerer Field Office fall within the judicially established Native American land areas of the Shoshone Tribe (USACE 1999). In the late nineteenth and early twentieth centuries, the planning area was used by Eastern Shoshone, Shoshone-Bannock, and Ute tribes in the vicinity of Fort Bridger. Ute bands occupied territory directly south of the planning area (BLM 2004c). The Kemmerer Field Office currently consults with the following tribes regarding Native American issues and concerns:

- Northern Arapaho
- Eastern Shoshone
- Shoshone-Bannock
- Northern Ute

The BLM also may consult with other Native American groups and tribes, as appropriate.

Native American concerns are governed by a number of legal mandates, including the NHPA, the AIRFA, the Native American Graves Protection and Repatriation Act (NAGPRA), federal regulations, EOs, and BLM guidelines as summarized in Chapter 1. The section of treaty rights discusses Native American treaty rights and the BLM's trust responsibilities in more detail.

3.5.2.1 Native American Sensitive Sites

Native American tribes have not specifically identified culturally sensitive sites within the planning area; however, this does not mean that no such sites exist: people typically are reluctant to identify resources with traditional or religious significance. In addition, this site type has only recently been recognized as a separate category and documented as such. Identifying culturally sensitive sites occurs through consultation with tribes, including interviews and on-the-ground site visits with elders or culturally knowledgeable practitioners, exploration of oral traditions, and ethnographic research.

Sites that may fall into the culturally sensitive category could include burials and stone cairns; rock art sites; rock alignments, including drive lines and stone circles; brush corrals and animal traps; natural

formations or plant collection areas; viewsheds; landscapes; the former location of historically recognized villages; or other locales. Burials, in particular, are of concern to most Native Americans, and the NAGPRA mandates that consultation occur between the federal agency and tribes to establish the affiliation of any human remains. Burials are not commonly located, but some are known within the planning area (BLM 2003a).

3.5.3 Tribal Treaty Rights and Trust Responsibilities

Native American treaty rights in the planning area are defined in Article 4 of the 1868 Fort Bridger Treaty, in which the Shoshone people are provided "the right to hunt on the unoccupied lands of the United States so long as game may be found thereon." This right applies to all public domain lands. The Kemmerer Field Office consults with tribes to develop specific measures to ensure that areas important to Native American communities are not transferred from federal ownership, physically modified, or impacted by decisions in ways that would restrict or deny access to Native Americans for traditional uses protected by treaty rights. No trust lands, no reservation lands, and no tribal properties are known to occur in the planning area.

Treaty Rights

During the 1800s, the U.S. government negotiated treaties with Native American tribal governments and obtained the vast majority of public domain land in the lower 48 states. Treaties are negotiated settlements that define federal obligations toward Native American tribes. Some 60 tribes negotiated and reserved their treaty rights to off-reservation lands and resources. The rights reserved to Native American tribes vary quite a bit from treaty to treaty. Hunting, fishing, gathering rights, and certain other land uses are the most common rights reserved through the treaty (BLM 1990b). Treaties affecting tribes in the planning area region are summarized below.

1863 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Bands of Shoshone. The treaty set the boundaries of the Eastern Shoshones to reflect their traditional base since the early 1800s from the upper Snake River on the north, east to the Wind River Mountains, and south into northern Colorado and Utah. The reservation established by this treaty included 44,672,000 acres in Colorado, Utah, Idaho, and Wyoming. It did not include the present-day boundaries of the Wind River Reservation east of the Wind River Mountains. Under the terms of the 1851 Treaty of Fort Laramie, the Crow people had been given almost all the land now encompassed by the Wind River Reservation (east of the Wind River Mountains) (Stamm 1999).

1868 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Shoshone-Bannock tribes. It established the boundaries of the Wind River Reservation (now 3,054,182 acres) (Eastern Shoshone Tribe 2004). Unlike the earlier Treaty of Fort Bridger (1863), which outlined boundaries of Shoshone territory west of the Wind River Mountains, the 1868 Treaty gave the tribes the right to occupy what had been their hunting grounds and winter camps to the east (Stamm 2003). In so doing, it denied claims to the Wind River valley made by competing tribes, such as the Arapaho, Crow, or Oglala Sioux (Stamm 2003).

1872 Brunot Cession Agreement. Ratified in 1874, this agreement reduced the Wind River Reservation by nearly one-third and opened the ceded southern portion to Anglo settlement. Pursuit of this agreement and the land it provided was largely motivated by a nationwide economic depression in 1873.

1896 Big Horn Hot Springs Land Cession Agreement. This agreement provided for the cession of the land that contains the Big Horn Hot Springs, a series of naturally occurring geothermal springs located at what was the northeast corner of the reservation. The total land ceded was an area of 10-square miles. The justification for this land transfer was the development of the land around the hot springs, which were rapidly developing a tourist clientele. The square mile around the hot springs was ceded to the state of

Wyoming. The most important feature of this agreement is that it established the Arapahos as equal partners to the Shoshones in the rights to claim the reservation.

1904 Land Cession Agreement. This agreement cut the reservation area roughly in half. Instead of paying the tribes outright, the government planned to compensate the tribes from the funds generated by selling the acquired lands under homestead, town site, coal, and mineral laws. This agreement was a source of disagreement between the Arapaho and Shoshone tribes. This agreement took place against a backdrop of renewed efforts to carry out the plans of the General Allotment Act (the Dawes Act) of 1887, which would also reduce tribal holdings, opening additional land to Anglo settlement.

Trust Responsibilities

Trust responsibility is the U.S. government's permanent legal obligation to exercise statutory and other legal authorities to protect tribal lands, assets, resources, and treaty rights, as well as a duty to carry out the mandates of federal law with respect to Native American tribes. *BLM Manual 8160 – Native American Coordination and Consultation* (BLM 1990b) defines trust responsibility as the obligation of the BLM to make "a reasonable and good faith effort to identify and consider, and to carry out programs in a manner sensitive to and consistent with, Native American concerns and tribal government planning and resource management programs."

The BLM acknowledges all Native American tribes that have historically and traditionally used land in the planning area and treats federally recognized tribes as sovereign nations. The BLM has initiated consultation with the Eastern Shoshone, Shoshone-Bannock, Northern Arapaho, and Northern Ute tribes in the planning area. An important component of this process is to continue to foster meaningful relationships with these tribes to understand and incorporate tribal culture, resources, needs, interests, and expectations into the RMP revision process.

Treaty Rights and Trust Responsibilities Policy

It is the objective of the U.S. Department of the Interior (USDI) to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Native Americans and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions impact tribal trust resources, trust assets, or tribal health and safety (USDI 1995).

The BLM has the following policy:

- Recognize traditional Native American cultural and religious values as important, living parts of our Nation's heritage, and develop the capability to address adequately any potential disruption of the traditional expression or maintenance of these values that might result from BLM land use decisions.
- Coordinate and consult regularly with appropriate Native American groups to identify and consider their concerns in BLM land use planning and decisionmaking, and fully document all coordination and consultation efforts.
- Review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans.
- Participate in developing consistent interagency guidance, procedures, and expertise to address Native American and tribal government policies and programs.
- Avoid unnecessary interference with Native American religious practices.
- Protect sensitive and confidential information about Native American values, practices, and the specific locations with which they are associated from disclosure to the public, to the greatest degree possible under law and regulation (BLM 1990b).

3.5.4 Paleontological Resources

Scientifically significant fossils include all vertebrate fossil remains (body and trace fossils) and plant and invertebrate fossils determined, on a case-by-case basis, to be scientifically unique. Paleontological resources (fossils) include the bones, teeth, body remains, traces, or imprints of plants and animals preserved in the earth since a past geologic time. All fossils offer scientific information, but not all fossils offer significant scientific information. Among paleontologists, fossils generally are considered scientifically significant if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most fossils occur in sedimentary rock formations. Although experienced paleontologists generally can predict which formations will contain fossils and what types of fossils will be found based on the age of the formation and its depositional environment, predicting the exact location where fossils will be found without field surveys is usually not possible (BLM 2003a).

Resource Condition

Geologic units in the planning area are classified according to the Probable Fossil Yield Classification, usually at the formation or member level, according to the probability of yielding resources of concern to land managers, primarily vertebrate fossils. The classification uses a ranking of 1 through 5, with Class 5 assigned to units with the highest potential for fossils. The classifications are described below.

> **Class 1.** Igneous and metamorphic geologic units, or units with highly disturbed preservational environments not likely to contain recognizable fossil remains. Management concern is negligible for Class 1 resources and mitigation requirements are rare.
>
> **Class 2.** Sedimentary geologic units not likely to contain vertebrate fossils or significant nonvertebrate fossils. Management concern is low for Class 2 resources and mitigation requirements are not likely.
>
> **Class 3.** Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, or units of unknown fossil potential. Management concern may extend across the entire range of management. Ground-disturbing activities require sufficient mitigation to determine whether significant resources occur in the area of the proposed action.
>
> **Class 4.** Class 4 units are Class 5 units with lowered risk of human-caused adverse impacts or lowered risk of natural degradation. Ground-disturbing activities require assessment to determine whether significant resources occur in the area of the proposed action. Mitigation may include full monitoring of significant localities.
>
> **Class 5.** Highly fossiliferous geologic units that regularly produce vertebrate fossils or significant nonvertebrate fossils that are at risk of natural degradation or human-caused adverse impacts. Class 5 areas receive the highest level of management focus. Mitigation of ground-disturbing actions is required and may be intense. Areas of special interest are designated and intensely managed.

In the planning area, the Bridger, Green River, Wasatch, and Evanston formations are the only formations (described below) rated as Class 5 geologic units.

Bridger Formation. This formation has produced at least 25 families of fossil Eocene mammals and is world-renowned among paleontologists. Numerous invertebrate and plant localities also occur in this formation, including fossil mollusks, leaves, algae, pollen, spores, and insects.

Green River Formation. This Eocene-age formation contains a spectacular assemblage of vertebrate and invertebrate fossils. Fossil Butte National Monument, administered by the NPS, lies about 10 miles

west of Kemmerer. It was created in 1974 to preserve, display, and interpret paleontological resources of the Green River and Wasatch formations. This 50-million-year-old lake bed contains one of the richest fossil concentrations in the world with complete paleo-ecosystems that span 2-million years recorded in limestone (NPS 2004d). A wide range of species are found in the formation, including more than 25 kinds of fish and many varieties of insects, plants, reptiles, birds, and mammals (NPS 2004d).

Wasatch Formation. This Eocene-age formation contains extensive mammal remains. At Fossil Butte National Monument, for example, the fossil assemblages contain at least 8 species of reptiles and as many as 34 species of mammals. Reptiles include lizards, turtles, crocodiles, and alligators. Mammals include carnivores, perissodactyls, condylarths, artiodactyls, and primates, among others. Aquatic reptiles dominate the lower two assemblages, while mammals and lizards dominate the upper assemblage (Gunnell 2002).

Evanston Formation. This formation straddles the Cretaceous and Paleocene boundary, which is considered significant in terms of providing evidence of a mass extinction of dinosaurs, as well as other species. The formation contains an extensive collection of Paleocene mammals.

Management challenges for paleontological resources include implementation of proper mitigation requirements, appropriate land use decisions and prescriptions, compilation of data about known or potential paleontological localities, compilation of data on geological formations that may contain fossils and their overall sensitivity for fragile or rare resources, methods of accessing those data in a timely fashion, and development of recreation and interpretive opportunities. Issues of concern that could represent challenges to the management of paleontological resources include all surface-disturbing activities, such as oil and gas exploration and development; coalbed methane development; other mineral development (leasable, locatable, and salable); ROW; and land tenure adjustments. In addition, adequately trained staff and proper funding are needed.

Management of paleontological resources aims to protect scientifically significant fossils for the benefit of the public. Paleontological resources on BLM lands in the planning area are currently managed under the RMP (BLM 1986a), which directs the following:

- Authorizations for surface-disturbing operations are conditioned to minimize adverse impacts to paleontological resources.
- Operations causing disturbance in the Green River Formation require a paleontological survey by a qualified paleontologist and mitigating measures, as appropriate.
- For surface disturbance in other vertebrate-bearing formations, including the Bridger and Wasatch formations, a survey may be required depending on the extent of the proposed disturbance and the proximity of known paleontological sites.
- A paleontologist must have an approved permit from the Wyoming State Office of the BLM to survey and collect fossils from public land.
- Holders of authorizations for actions in all geological formations that may impact paleontological resources are required to stop operations and contact the BLM if paleontological or fossil resources are found.

Collecting fossils from public lands is allowed with some restrictions, depending on the significance of the fossils. Hobby collection of common invertebrate or plant fossils by the public for personal use is allowed in reasonable quantities using hand tools. Some commercial quarries exist on private land within the planning area. Commercial collecting of paleontological resources on public land is not permitted. Collecting significant fossils (all vertebrate and any administratively designated plant or invertebrate fossils) may be done only under permits issued by the BLM to qualified researchers. The basic permit is

the survey and limited surface collection permit issued for reconnaissance work and collection of surface finds, with a 1-square meter limit to surface disturbance. If the work exceeds 1-square meter or requires mechanized equipment, the researcher must apply for an excavation permit. Prior to authorization of an excavation permit, and in some cases for survey permits in other management areas (MAs), the BLM must prepare an Environmental Assessment for the proposed location. Some BLM-approved paleontologists also serve as consultants to companies when mitigation is required for their projects on public land. All fossils collected under a permit remain public property and are placed in an approved repository.

3.6 Land Resources

Lands Resources include Lands and Realty, Renewable Energy, ROW and Corridors, Livestock Grazing Management, Recreation, Travel Management, OHVs, and Visual Resource Management (VRM). Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions.

3.6.1 Lands and Realty

The Kemmerer Field Office lands and realty objectives are to (1) manage public lands to support goals and objectives of other resource programs, (2) provide for uses of public lands according to regulations and compatibility with other resources, and (3) improve management through land-tenure adjustments. The key activities of the lands and realty program include (1) land use authorizations (e.g., leases and permits, ROW, recreation and public purpose (R&PP) leases, airport leases) and (2) land-tenure adjustments (e.g., sales, exchanges, donations, purchases, and withdrawals). The BLM works cooperatively with federal agencies, the State of Wyoming, counties and cities, and other public and private land holders in the execution of the Kemmerer Field Office lands and realty program.

Land Use Authorizations

Land use authorizations include various authorizations to use BLM-administered land, such as leases, permits, and easements, under FLPMA Section 1732(b); ROW under FLPMA Sections 1761-1771 and Section 185 Mineral Leasing Act of 1920, as amended (30 USC Section 185); R&PP leases under the R&PP Act of 1926, as amended (43 USC 869 et seq.); Desert Land Entries, under the Act of March 3, 1877, as amended (43 USC 321 et seq.); and airport leases under the Act of May 24, 1928, as amended. Past and current conditions associated with these components of land use authorizations are described below.

Leases, Permits, and Easements

Section 1732(b) of the FLPMA authorizes the BLM to issue leases, permits, and easements for the use, occupancy, and development of public lands. Permits are typically issued to resolve trespass cases or to authorize minimum impact activities that involve either little or no land improvement, construction, or investment. Historically, permits within the Kemmerer Field Office area have been requested for rig stack construction associated with oil and gas development or to provide interim authorization for trespass issues.

Leases under Sections 302, 303, and 310 of the FLPMA are long-term and typically require a substantial economic investment in the land. The Kemmerer Field Office has not had a demand for land use leases for the past 20 years. Historic lease uses included agricultural development and National Guard use.

Easements are granted to ROW holders when the public land is being conveyed out of federal ownership (i.e., sale, exchange, R&PP conveyance, etc.) The BLM Kemmerer Field Office does not routinely issue easements. Easements may be used to assure that uses of public lands are compatible with nonfederal uses occurring on adjacent or nearby land, for example a scenic easement. There are no easements currently issued in the planning area.

Recreation and Public Purposes Act Leases and Sales

The R&PP Act authorizes the sale or lease of public lands for recreational or public purposes to state and local governments and to qualified nonprofit organizations. There are three active R&PP Act leases currently authorized in the planning area. Leases for the Pine Creek Ski Area near Cokeville and the Lions Club Park outside of Kemmerer were issued to Lincoln County. The Buford Foundation has an R&PP lease for a youth camp in Star Valley. Lincoln County is working on completing requirements to acquire patents on both of their R&PP leases, which would have reversion clauses on the patents if the

lands transferred out of their lease. If the lands transferred out of the county's ownership, the patents would be revoked, as described under 43 CFR 2741.9. The Kemmerer Field Office has received a few inquiries from local communities to develop R&PP leases, but does not have any applications on file at the present time.

Airport Leases

Airport leases are granted in conjunction with the Federal Aviation Administration for public airports.

Land Tenure Adjustments

Land ownership (or land-tenure) adjustments refer to those actions that result in the retention of BLM-administered land, disposal of BLM-administered lands, and (or) the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public lands be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted.

Tracts of land designated in BLM land use plans as potentially available for disposal were, in the past, more likely to be conveyed out of federal ownership through an exchange rather than a sale. The end result of this approach is that very few land-tenure adjustments were completed over the years. The land exchange process is lengthy, and land exchanges are difficult to complete. While there are any number of possible land exchanges that BLM can consider, it has become increasingly difficult to develop exchanges with high public benefits and reasonable processing costs. Almost all BLM efforts and any available budgetary resources for land-tenure adjustments were concentrated on land exchanges; consequently, very few land sales were processed. In some instances, land exchanges do not result in lands needed for public purposes or lands needed by individual land owners being transferred into private ownership. For this reason, land-tenure adjustments will be more balanced between land exchanges and land sales in the future. In addition, the BLM's work priority is to process energy-related ROW first, followed by other nonenergy-related work. Given the current high demand for energy-related ROW, work on nonpriority land exchange and land sale actions will be limited within the planning area for the foreseeable future.

Acquisition of lands and interests in lands is an important component of the BLM's land management strategy and is accomplished through several means, including exchange, purchase, donation, and condemnation, as described below. Acquisition by condemnation is rare and has not been used by the BLM for any acquisition in the planning area. Lands and interests in lands are acquired to provide the following:

- Improve management of natural resources through consolidation of federal, state, and private lands.
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources.
- Implement specific acquisitions authorized or directed by acts of Congress.

Exchanges

Exchanges, that is, the process of trading lands or interests in lands, are the primary means by which land acquisition and disposal are carried out. Public lands may be exchanged for lands or interests in lands owned by corporations, individuals, or government entities. Except for those exchanges that are congressionally mandated or judicially required, exchanges are voluntary and discretionary transactions with willing land owners. The lands to be exchanged must be of approximately equal monetary value and located within the same state. Exchanges must also be in the public interest and conform with applicable BLM land use plans.

Land exchanges are the BLM's preferred method of acquisition. They are used to (1) bring lands and interests in land with high public resource values into public ownership, (2) consolidate land and mineral ownership patterns to achieve more efficient management of resource and BLM programs, and (3) dispose of public land parcels identified for disposal through RMPs.

At present, the only recent land exchange within the Kemmerer Field Office is the Rocky Mountain Elk Foundation consolidated land exchange completed in 2003.

Purchases

BLM has the authority, under Section 1715 of the FLPMA, to purchase lands or interests in lands. Similar to other acquisitions, purchase is used to acquire key natural resources or to acquire legal ownership to lands that enhance the management of existing public lands and resources. Acquiring lands and interests in lands through purchase helps consolidate management areas to strengthen resource protection. Purchases can be accomplished with Land and Water Conservation Funds, donations, or receipts from the Federal Land Transaction Facilitations Act sales. Purchases are used primarily to enhance recreational opportunities, acquire crucial wildlife habitats, or access. There have not been any direct purchases completed in the planning area. Land exchanges are the primary opportunity for acquiring lands to enhance recreational opportunities, protect historical properties, or acquire crucial wildlife habitats.

Easements are purchased to secure public access to public lands. The BLM currently manages 36 separate easements acquired for public access in the planning area. These easements account for approximately 38 miles of road covering approximately 361 acres. The easements currently held by the BLM in the Kemmerer Field Office were granted by the following entities, both public and private:

- Private landowners granted more easements than any other single or group of entities, with a total of 16 (44.4%).
- The next largest grantor of easements (36.1%) was a group of companies including the Etcheverry Sheep Company, Utah Power and Light, Peternal Brothers, Inc., The Thompson Land and Livestock Company, Union Pacific Land Resource Corporation, Kemmerer Coal Company, and the P&M.
- The State of Wyoming granted five easements (13.8%).
- The Town of Kemmerer granted one easement (2.7%).
- The Kemmerer Wyoming Stake of the Latter-day Saints granted one easement (2.7%).

Table 3-26 lists the total lengths and areas of existing easements; however, these distances may not represent continuous segments. For example, the 11.35 miles of easement on Smiths Fork Road actually represent six separate easements.

Donations

The BLM occasionally receives gifts or donations of lands or interests in land when an entity elects not to receive the market value for the interests being conveyed.

Land Sales

Section 1713 of the FLPMA authorizes the sale of public lands. The objective of BLM land sales is to provide a means for disposal of public lands found, through the land use planning process, to be suitable for disposal. Public lands must be sold at not less than fair market value and meet the sale criteria of the FLPMA. The BLM's current policy and regulations require the use of competitive sale procedures unless

the authorized officer determines the public interest would best be served by modified competitive bidding or direct (noncompetitive) sale. Properties identified for disposal are identified in Appendix G.

Table 3-26. Existing Access Easements, Kemmerer Field Office

Easement	Length (Miles)	Area (Acres)
Kemmerer FNC	0.265	1.0
Smith Fork Road	2.33	27.16
Lyman Cattle FNC	4.538	11.1
Butcher Knife SP	0.486	4.19
UPR Coyote SP	0.595	4.03
Smiths Fork Road	9.017	88.65
Dempsey FNC	0.47	1.0
Dempsey Road	9.938	92.86
Lucky Break PIT RES	0.075	3.67
IGO Road	2.362	28.67
Horse Creek Road	1.2331	14.97
Dee Ranch Road	3.49	42.15
Project RE-W4-36 (no geographic name)	0.495	6.0
Project RE-W4-45 (no geographic name)	0.214	2.5
Project RE-W4-47 (no geographic name)	1.95	23.85
VanTassel Road	0.019	0.236
Kemmerer PPLN	0.078	0.140
Raymond Canyon Road	0.267	1.72
South Fork Fontenelle Road	0.515	5.89
TRL Creek Road	0.254	1.545

Section 1719 of the FLPMA authorizes the conveyance of federal minerals through sale and specifies the conditions under which mineral rights will be conveyed. Conveyances shall reserve all minerals to the United States unless there are no mineral values in the land or the reservation of the mineral rights interferes with or precludes a more beneficial nonmineral use of the land. Under most circumstances, the BLM will require an exploratory program and extensive mineral report on the lands in question. Mineral rights are only conveyed upon payment by the applicant of fair market value for those mineral interests and all administrative costs of processing the application to acquire the mineral rights.

Withdrawals

A withdrawal is a formal action that sets aside, withholds, or reserves Federal lands by administrative order or statute for public purposes. The effect of a withdrawal is to accomplish one or more of the following:

- Segregates (closes) Federal land to the operation of all or some of the public land laws and/or mineral laws
- Transfers total or partial jurisdiction of Federal land between Federal agencies
- Dedicates Federal land for a specific public purpose

Withdrawals in the Kemmerer Resource Management area can be categorized into two major types including:

- Congressional – legislative withdrawals made by Congress in the form of public laws. Examples include designation for national parks, wild and scenic rivers or wilderness
- Administrative – withdrawals made by the President, Secretary of Interior, or other officers of the executive branch of the Federal Government. Examples include stock driveways and public water reserves

There are nine existing withdrawals to other federal agencies within the planning area (see Table 3-27). Other agency withdrawals usually do two things—transfer jurisdiction to the other agency and close the withdrawn public land to the operation of the public land laws including mineral location. This plan will not make decisions on revocation of other federal agency existing withdrawals. However, this plan does recognize that should a withdrawal be revoked by action of another agency, those lands that are suitable for return to public land status for management by the BLM will be managed in the same fashion as adjoining public lands.

Table 3-27. Existing Other Agency Withdrawals within the Kemmerer Field Office Planning Area

Withdrawals	Administering Agency	Acres
Green River Reclamation Project[1]	USBR	17,000
Seedskadee Reclamation Project[1]	USBR	3,600
Meeks Cabin Reservoir	USBR	435
Seedskadee Wildlife Refuge[1]	USFWS	1,060
Grey's River Elk Refuge	USFWS	657
Fossil Butte National Monument	NPS	7,420
Flaming Gorge National Recreation Area	USFS	120
Recreation, Administration, and Roadside Sites	USFS	3,950
Air Navigation Site	DOT	120

[1]Some of these areas may overlap, so the actual acreage withdrawn is less than the sum of the individual withdrawals.

BLM Bureau of Land Management
DOT Department of Transportation
NPS National Park Service
USBR U.S. Bureau of Reclamation
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service

There are five existing withdrawals administered by the BLM in the planning area (see Table 3-28). It is now federal policy to restrict all withdrawals to the minimum time required to serve the public interest; maximize the use of withdrawn lands consistent with their primary purpose; and eliminate all withdrawals that are no longer needed.

Table 3-28. Existing BLM Withdrawals within the Kemmerer Field Office Planning Area

Withdrawals[1]	Administering Agency	Acres
Public Waterway Reserves	BLM	2,105
Stock Driveways[2]	BLM	480
Coal	BLM	136,100
Phosphate	BLM	44,600
Oil Shale[2]	BLM	420,500

[1]Some of these areas may overlap, so the actual acreage withdrawn is less than the sum of the individual withdrawals.
[2]These withdrawals have been recommended for full or partial restoration; however, final action has not yet been taken.
BLM Bureau of Land Management

Public Water Reserves (PWR)

By Executive Order No. 107, dated April 17, 1926, the President of the United States ordered that every smallest legal subdivision of the public land surveys which was vacant, unappropriated, unreserved, public land and which contained a spring or water hole be withdrawn and reserved for public use in accordance with the provisions of Section 10 of the Act of December 29, 1916 (39 Stat. 865; 43 U.S.C. 300). The Executive Order was designed to preserve for general public use and benefit all unreserved public lands containing water holes or other bodies of water needed or used by the public for watering purposes. Even though it did not specify geographic areas, the order established a public water reserve for all springs and water holes capable of providing enough water for general use for watering purposes.

In general, no effort has been made to identify all these withdrawn sites so it is not always known how many there are or where they are. A public water reserve reserves a water right for BLM for public water holes and springs. PWRs are closed to surface entry and to nonmetalliferous mineral entry under the Pickett Act of June 25, 1910.

Before 1926, PWRs were identified on a site specific basis and were established when springs and water holes were physically identified on public lands. After the springs and water holes were identified, the locations would be incorporated into chronologically numbered PWRs. PWRs with early numbers before 107 usually refer to site specific reservations.

After 1926, an open ended PWR was created through an Executive Order entitled “Public Water Reserve No. 107”. PWR 107 authorized the withdrawal of certain vacant unappropriated, unreserved public land containing a spring or water hole and those lands within a quarter of a mile around the spring or water hole. PWR 107 ended the site specific system of reserving springs and water holes.

Generally PWRs do not necessarily reserve the entire yield of each public spring or water hole, but rather PWRs reserve water for domestic human consumption and for stock watering. Usually all water from a PWR in excess of the minimum amount necessary for public watering purposes is available for appropriation under State water law, and may be leased for water purposes.

Stock Driveways

Stock driveways were created under the Pickett Act of June 25, 1910 . A stock driveway withdrawal reserves public lands for the free public use in moving livestock to summer and to winter ranges or to shipping points and to ensure public access to various watering places on the Federal range.

Originally, stock driveway reservations were withdrawn from disposition under the mining laws, but not from the mineral leasing laws. The Act of January 29, 1929 (45 Stat. 1144; 43 USC 300) provided that stock driveway withdrawals do not apply to deposits of coal and other minerals, and they are closed to surface entry. The regulations provide that all prospecting and mining operations need to be conducted to cause minimum interference and hazards to the use of the surface for stock driveway purposes.

Mineral Withdrawals

Mineral withdrawals were done to protect the mineral resource involved from encumbrances that could interfere with development, particularly mining claims, and entry under the public land laws. Mineral withdrawals can overlap other existing withdrawals and take precedent over the area with the exception of stock driveway withdrawals. See maps 34 through 36 for the location of oil shale, coal, and phosphate withdrawals in the planning area.

Oil Shale

Oil shale withdrawals generally segregate land from metalliferous and non-metalliferous mineral location, and from entry under the public land laws. However, the western edge of the Green River Basin portion

of the oil shale withdrawal has been modified in two areas by Wyoming Oil Shale Classification Order #1. One area allows metalliferous mineral locations, the other allows non-metalliferous mineral locations.

Coal

Coal withdrawals segregated land from metalliferous mineral location, and from entry under the public land laws. However, lands withdrawn for coal were closed to all forms of mineral location on August 11, 1975, and no mining claims could be located on those lands after that date.

Phosphate

Phosphate withdrawals exist in the western portion of the planning area known as the Overthrust Belt, and protect phosphate resources by closing the lands to non-metalliferous mineral location.

Desert Land Entries

The Desert Land Entries Act was passed by Congress on March 3, 1877, to encourage and promote the economic development of arid and semiarid public lands in the western United States. The purpose of the Act is to permit the reclamation by irrigation of arid public land through individual effort and private capital. Lands not producing any reasonable remunerative agricultural crop by the usual means or methods of cultivation without artificial irrigation may be considered for a desert land entry. The lands must be untimbered, surveyed, unreserved, and unappropriated. Tracts need not be contiguous, but should be sufficiently close to each other so as to be managed satisfactorily as an economic unit. The proposed crop may include any agricultural product that the land under consideration is generally adapted and would return a fair reward for the expense of producing it.

There have been no successful desert land entry applications filed in the Kemmerer Field Office planning area primarily due to soil characteristics, irrigation requirements, salinity issues, and the practicability of farming the lands as an economically feasible operating unit. The growing season in this area is very short, which limits many agricultural opportunities. The costs to develop the parcel do not equate to the value of the crop.

Management challenges identified for lands and realty in the planning area are based, in part, on historic activities and trends, as well as current and future needs of public resources and internal and external customers. Management challenges include managing BLM lands to adequately meet the needs of multiple uses per the FLPMA; improving the management of natural resources; obtaining important lands needed for the protection of endangered species, enhancing biological diversity, increasing recreational opportunities, and preserving archeological and historical resources; bringing into public ownership lands and interests in land with high public resource values; consolidating land and mineral ownership patterns for more streamlined management of resources and BLM programs; and disposing of lands identified for disposal.

Management actions for lands and realty generally address meeting the needs of internal and external customers through land disposal, withdrawal, purchase, and sale. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.2 Renewable Energy

Renewable energy generally is defined as energy derived from sources continuously replenished by natural processes. These sources include wind, solar, biomass, and geothermal. Wind energy refers to the kinetic energy generated from wind produced by power-generating turbines. Solar energy is the use of the sun's energy to produce electricity, often through the use of photovoltaic panels that convert sunlight directly into electricity using semiconductor materials. Biomass (also called bioenergy) is the process of converting forestry and agricultural crops, crop-processing wastes and residues, animal manures, and landfill methane gas into electricity. These waste products are either burned directly or

converted into fuels that can be burned to produce energy. Geothermal energy is heat in the form of hot water, steam, or rocks near the surface of the Earth's crust used for direct heating and cooling, or for the generation of electricity (Energy Atlas 2004). Nonrenewable energy sources generally are limited to fossil fuels, such as coal, oil, and gas, which are addressed in the Mineral Resources section of this document. The following discussion focuses on potential sources of renewable energy within the planning area.

Wyoming represents one of the strongest potential wind resources in the country and presently is an exporter of wind power to several surrounding states. The state also has some potential for solar, biomass, and geothermal energy; however, the demand for these renewable energy sources is not as strong. One geothermal energy development project exists within the planning area. The Auburn Hot Springs in the Star Valley contains numerous vents emitting carbon dioxide and hydrogen sulfide gas and saline water ranging from 68 ºF to 140 ºF. The location of these hot springs is controlled by northwest-trending high-angle faults (Hinckley and Breckenridge 1977).

Currently, the installed renewable energy capacity in Wyoming is 284.65 megawatts (MW) of wind energy, 0.05 MW of solar energy, and 0 MW of biomass and geothermal energy (AWEA 2005; Energy Atlas 2004). A recent study, "Assessing the Potential for Renewable Energy on Public Lands," presented a nationwide overview of renewable resources on BLM lands. In this study, Wyoming was assessed with a high potential for wind-energy development and a low potential for solar, biomass, and geothermal energy (BLM 2003a). Because the current demand and development potential for solar, biomass, and geothermal energy are lower, wind energy is the primary focus in the remainder of this section.

At present, there is one wind farm located within the planning area. The Uinta County Wind Project, administered by Uinta County Wind Farm, LLC, a subsidiary of FPL Energy Wyoming, LLC, comprises 80 windmills, all located on private and state lands. While no windmills are located on BLM-administered lands, there are 14 miles of associated access roads and powerlines permitted on BLM-administered lands, totaling 136.4 acres. An additional 27 miles of access roads and powerlines are located on adjoining private and state lands.

Wind-energy potential within the planning area is described by wind power class as shown in Table 3-29. This information is derived from U.S. Department of Energy (DOE) National Renewable Energy Laboratory wind-energy potential data (NREL 2002). Wind power class areas comprise large geographic areas, within which there are numerous areas of land that do not meet the overall resource potential for each wind power class. This being the case, there is likely a rather large margin of error in the mapped locations and boundaries, and, thus, in any acreage calculations.

Table 3-29. Wind Energy Potential by Wind Power Class

Wind Power Class	Resource Potential	Wind Speed (mph)
1	Poor	0-12.5
2	Marginal	12.5-14.3
3	Fair	14.3-15.7
4	Good	15.7-16.8
5	Excellent	16.8-17.9
6	Outstanding	17.9-19.7
7	Superb	> 19.7

Source: NREL 2002
> greater than
mph miles per hour
NREL National Renewable Energy Laboratory

The NEPA encourages the development of renewable energy resources as part of an overall strategy to develop a diverse portfolio of domestic energy supplies for the future (National Energy Policy Development Group 2001). Wind-power generating capacity in the United States quadrupled between 1990 and 2003 (GAO 2004). BLM's general policy is to encourage the development of wind energy in acceptable areas.

Management challenges for developing renewable energy projects in the planning area are based, in part, on the fact that market trends and market value determine the pace and magnitude of renewable energy development. The demand for renewable energy is illustrated by development projects throughout the west on public and private lands. The importance of renewable energy sources increases in the planning area as nonrenewable energy prices increase and as the need grows for more and cleaner energy sources. Therefore, interest in wind-energy development involving BLM-administered lands is increasing in the western United States. Current management does not limit wind-energy development to specific areas or power classes.

To facilitate renewable energy production and development of renewable sources, the BLM works cooperatively with the DOE, USDA, EPA, Council on Environment Quality (CEQ), and members of the Western Governors' Association (BLM 2005b). The cooperative effort will continue to address problems facing the west and facilitate renewable energy production, including areas in the planning area.

Due to the wind-energy potential in the west and the associated interest and applications for wind energy on BLM lands, the BLM prepared a *Final Programmatic* Environmental *Impact Statement on Wind Energy Development on BLM-Administered Lands* (BLM 2005b). This EIS will be referred to by the BLM when considering development of wind-energy resources on BLM-administered lands in the planning area. Management actions for renewable energy include the consideration of renewable energy projects throughout the planning area on a case-by-case basis with consideration of other resource values and generally to support national energy plans and policies regarding the development of renewable energy projects. These actions are included in the alternatives and are described in more detail in Chapter 2.

3.6.3 Rights-of-Way and Corridors

ROW and corridors often involve narrow strips of land used for various infrastructure purposes within the planning area. A ROW grant is an authorization to use specific pieces of public land for a certain project, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. Over the past 20 years, ROW on BLM-administered lands in the planning area have been approved for roads; to support oil, gas, and mineral resource exploration and development; and for powerlines, telecommunication cables and sites, pipelines and associated facilities, such as compressor stations. An important component of the ROW program is the intrastate and interstate transportation of commodities that ultimately are delivered as utility services (e.g., natural gas, electricity) to residential and commercial customers. Equally important on the local level is the growing demand for legal access to private homes and ranches using ROW grants.

The BLM and other agencies (Office of Electricity Delivery and Energy Reliability, DOE, and the USFS) are preparing the West-wide Energy Corridor Programmatic EIS. The EIS will evaluate potential impacts associated with the proposed Kemmerer RMP to designate corridors on federal land in the 11 Western States (including Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. The BLM and other agencies issuing the EIS will amend, as necessary, their respective land use plans by designating a series of energy corridors effective upon signing of the Record(s) of Decision.

Currently, more than 1,600 ROW exist in the planning area issued under a variety of laws over time and administered according to the conditions specified in the specific ROW grant. On the average, 100 to 125 new or amendment ROW applications are processed annually. In the 20-year period from 1985 through

2005, 1,150 ROW were issued on approximately 45,000 acres of public land in the planning area. On the average, 60 ROW authorizing use of around 27 acres per ROW, or 1,620 acres total per year, have been authorized in the planning area.

The majority of the ROW workload in the Kemmerer Field Office area is generated through oil and gas lease development. During the last 20 years, more than 500 APDs were approved in the Kemmerer Field Office area. On the average, each APD has a corresponding road ROW, as well as a pipeline ROW.

During the 20-year period from 1985 through 2005, a large number of major ROW applications were processed and approved in the Kemmerer Field Office. These major ROW include fiber optic lines, as well as major pipelines, plant sites, and large powerlines. The fiber optic lines followed I-80 and railroad lines, as well as pipeline routes. Most of the large pipeline projects begin or end at the Williams Opal Plant, near Opal, Wyoming, and pass through the Muddy Creek Compressor area before heading east toward the Granger Plant, southwest toward Utah and California, or west on the Ignacio-Sumas Pipeline route. There are three major communication sites in the planning area, each with more than three users. In addition to these three sites, 24 other communication sites occur in the planning area. On average, two major ROW applications are processed per year. This level of major ROW project activity is expected to continue.

Currently, no designated future corridors on lands administered by the Kemmerer Field Office exist. Typically, ROW were established in the least environmentally damaging areas and following de facto utility and travel systems, but these are not necessarily located in preferred locations. Recommendations for the siting of utility corridors through the planning area were made by the Western Utility Group - Western Regional Corridor Study Committee (WUG 1992). Exclusion areas are areas where ROW and corridor and window designations are prohibited. Avoidance areas, which include seasonal restrictions on construction and other surface-disturbing activities, are areas where special environmental (e.g., crucial winter range) and (or) management considerations limit the timing of when ROW and corridors can be constructed. The following exclusion and avoidance areas were established in the Kemmerer Field Office by the 1986 RMP:

- Woodruff Narrows and Morgan Canyon (to protect bald eagle winter roost sites)
- Bridger Antelope Trap
- Sensitive plant population locations (four total)
- Raymond Mountain WSA
- Greater sage-grouse, raptor, elk calving, and (or) other species activity habitats
- Slopes in excess of 25 percent
- Class I and Class II VRM areas
- Areas ¼ mile or visible on horizon (whichever is closer) from a historic trail
- During periods when soil material is saturated, frozen, or when watershed damage is likely to occur
- Riparian areas.

Historically, ROW pipelines within the planning area have been buried, with the exception of the painter Reservoir Area and other isolated instances. Pipelines range from about 3½ inches up to 36 inches in diameter.

A large portion of the regional demand for public ROW has focused on exporting renewable and nonrenewable energy products through and from the sparsely populated western states to areas of high population. Most recently, this activity has been dominated by west coast power demands. The upsurge of exploration and development of cleaner burning energy fuels, such as natural gas and coal bed methane, has resulted in the need for more pipelines and higher pipeline capacities.

Management challenges for ROW and corridors are not well defined, but the need for power transmission, telecommunications, infrastructure improvements, and pipeline throughput capacity is anticipated. As stated above, no designated corridors are on lands administered by the Kemmerer Field Office at this time. The demand for ROW and corridors is influenced by specific actions within the planning area (such as oil and gas leasing) and by economic forces and other external pressures and conditions independent of resource management decisions in the planning area. For example, the demand for expanded infrastructure capabilities through the planning area can be largely dictated by state or national needs and requirements. Technological advancements also have brought new demands for public land, largely related to wind and solar energy and telecommunications (e.g., cellular and fiber optic).

Management actions for ROW and corridors include meeting the anticipated needs for power transmission, telecommunication, infrastructure, and pipeline throughput capacity; making public lands available to meet the needs for major ROW customers (e.g., an intrastate pipeline); and making public lands available to meet the needs for smaller ROW (e.g., roads or pipelines for oil fields, access roads for private homes and ranches). Management actions are incorporated in the alternatives for ROW and corridors and described in more detail in Chapter 2.

3.6.4 Livestock Grazing Management

Livestock grazing includes the grazing of domestic animals (e.g., cattle, sheep, horses, and goats) within the planning area and is authorized on BLM-administered lands by the Taylor Grazing Act of 1934, the FLPMA of 1976, and the Public Rangelands Improvement Act of 1978. The Kemmerer Field Office currently administers grazing on 224 allotments, of which 159 are permitted under Section 315(b) of the Taylor Grazing Act and 65 are leased under Section 315(m) of the Act. Fees received from livestock grazing under Sections 3 and 15 of the Taylor Grazing Act are distributed as follows.

- Inside Grazing Districts (Section 3 of the Taylor Grazing Act)
  - 50.0% Kemmerer Range Improvement Fund*
  - 12.5% State
  - 37.5% United States Treasury
- Outside Grazing Districts (Section 15 of the Taylor Grazing Act)
  - 50.0% Kemmerer Range Improvement Fund*
  - 50.0% State
  - * Secretary of the Interior may divert funds to special projects at the national level.

Allotments vary in size, number of permittees, and number of animal unit months (AUMs). The largest allotment, Granger Lease (470,680 acres), provides 36,091 AUMs for three livestock operators. Multiple smaller allotments occurring within the planning area comprise 40 acres or less, one operator, and as few as five AUMs.

The 224 allotments in the planning area provide livestock AUMs for 229 permittees/lessees operating cattle, sheep, and horses on BLM-administered land. Of the 224 allotments, 73 currently allow grazing by sheep, 185 by cattle, and 9 by horses. Due to allotments that allow grazing by more than one type of livestock, these numbers exceed the total number of 224 allotments in the planning area. The 157,249 AUMs currently available in the planning area are divided among cattle (97,190 AUMs), sheep (59,505 AUMs) and horses (554 AUMs).

Livestock are moved from local ranch operations to allotments and between allotments by trucking or trailing. Trailing livestock herds has typically been the means of transport for sheep from winter ranges to the east to spring/summer ranges to the west. Historically, livestock have trailed within the Kemmerer Planning Area by means of the North Trail/Slate Creek Trail complex (Lincoln County) and the South Trail complex (Uinta County).

BLM manages several allotments in the planning area are managed cooperatively with grazing associations (e.g., Smithsfork, Cumberland, and Rock Creek). In addition, the BLM has developed allotment management plans (AMPs) on 18 allotments, employs coordinated resource management on 18 allotments, and has informal grazing systems implemented on 5 allotments. To provide a description of existing conditions in the planning area, several of the larger allotments are briefly summarized in this section.

Cumberland/Uinta Allotment

The Cumberland/Uinta Allotment is 337,659 acres with authorized livestock use by cattle (88.9%), sheep (10.9%), and horses (0.2%). Most of this allotment (215,335 acres) is administered by the BLM with the remaining acreage divided between state and private ownership (BLM 2000b). Most of the Cumberland/Uinta Allotment is located in Lincoln and Uinta counties between Kemmerer and Evanston, Wyoming; however, this allotment also includes land in Rich County, Utah, east of the Bear River. Forage allocation for the Cumberland/Uinta Allotment is 48,788 AUMs, representing approximately 20 percent of the estimated total annual vegetation growth (BLM 2000b). Remaining livestock grazing within the Cumberland/Uinta Allotment is managed in accordance with the Cumberland/Uinta Allotment Cooperative Management Plan (BLM 2000b).

Rock Creek Allotment

The Rock Creek Allotment is an 81,815-acre cattle and sheep allotment comprising 60,784 acres of public land, 13,301 acres of state land, and 7,113 acres of private land located between Kemmerer and Cokeville, Wyoming (BLM 2002d). The Rock Creek Allotment provides a total of 14,161 livestock AUMs, including 10,515 for cattle and sheep use, 720 AUMs reserved for trailing, and 2,926 AUMs reserved for wildlife. Livestock grazing within the Rock Creek Allotment is managed in accordance with the Rock Creek AMP Revision (BLM 2002e).

Smithsfork Allotment

The Smithsfork Allotment is a 86,240-acre cattle and sheep allotment located north and east of Cokeville, Wyoming (BLM 2005j). Most (64,725 acres) of the Smithsfork Allotment is BLM-administered land, but 14,627 acres of private and 11,585 acres of state land are included. Total AUMs for the Smithsfork Allotment include 6,212 AUMs for cattle and 3,605 AUMs for sheep. Livestock grazing within the Smithsfork Allotment is managed in accordance with the Smithsfork AMP (BLM 2005j).

Twin Creek Allotment

The Twin Creek Allotment is a 42,693-acre cattle (35.9% authorized use) and sheep (64.1% authorized use) allotment (BLM 2005k). Most (34,438 acres) of the Twin Creek Allotment is BLM-administered land, but 5,593 acres of state and private land are voluntarily incorporated in the allotment. Total AUMs for the Twin Creek Allotment include 1,826 AUMs for cattle and 2,706 AUMs for sheep. Livestock grazing within the Twin Creek Allotment is managed in accordance with the Twin Creek A MP (BLM 2005k).

The Kemmerer Field Office administers livestock grazing on BLM-administered land in Utah and Idaho for allotments that cross the Wyoming State line. For example, the Cumberland/Uinta and the Crawford Mountain allotments include 23,153 and 800 acres, respectively, in Utah. Four allotments include the following acres in Idaho: Erwin Creek (3,880 acres), Boyd Hollow (7,491 acres), Christy Canyon (10,954 acres), and Poison Creek (21,806 acres). An MOA between the Kemmerer Field Office, Salt Lake Field Office, and the Idaho Falls District Office controls management of BLM-administered lands in interstate allotments.

The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) provides the standards for the basis for assessing and monitoring rangeland conditions and trends within the planning area. As of May 12, 2006, rangeland health assessments have been performed on 221 allotments with the balance scheduled for completion by 2010.

BLM-administered public lands are important to local ranch operations throughout the planning area because the majority of ranching operations hold public land grazing permits or leases. The public lands are often intermingled with private and state lands, which are grazed as one unit. Public lands maintain the integrity of many ranch operations and support the cultural lifestyle and livelihood of the grazing permittees/lessees. In many cases, if ranchers lost their BLM grazing permit(s)/lease(s), the viability of their ranch operation would be seriously affected, thereby making it extremely difficult for them to stay in the livestock business. In the southwestern portion of the planning area in Uinta County and for the permits/leases in northern Lincoln County (Star Valley area), public lands generally are less important to the viability of most of the grazing operations. In these areas, BLM-administered public lands usually comprise isolated 40, 80, or 160-acre tracts of land, and the viability of most grazing operations likely would be maintained if the BLM grazing permits/leases were lost.

Animal Unit Month (AUM) Allocations and Allotments

Since the latter part of the nineteenth century, lands within the planning area have been used by ranchers for grazing livestock. In the early part of the twentieth century, there were more sheep than cattle in Wyoming; however, sheep numbers reached their peak in the 1920s and have steadily declined since then.

The Kemmerer Field Office manages lands for livestock grazing in Lincoln, Uinta, and Sweetwater counties in Wyoming, as well as allotments that extend into Utah and Idaho. The largest federal surface acreages exist in Lincoln County. Approximately 1.4-million surface acres of public land are available for grazing within the 224 grazing allotments. Grazing allotments typically contain a combination of federal, state, and private lands and range in size from approximately 7 acres to 470,579 acres, with an average allotment size of 10,149 acres. The Kemmerer Field Office administers 272 grazing permits/leases, allowing approximately 157,249 AUMs of livestock forage. Actual AUMs used annually in the planning area typically correspond to authorized AUM removal. Current management evaluates 10 percent of grazing allotments annually to determine whether they meet standards for healthy rangelands.

Grazing systems used on public lands within the planning area fall into the following six categories: yearlong, season long, early season, late season, split season, and rotation (i.e., deferred rotation, rest rotation, and time-controlled grazing systems). Of the 272 grazing permits/leases in the planning area, approximately 21 percent (57) authorize year-round use, which is a reflection of the intermingled land pattern that exists across the planning area, as well as the small percentage of public land found in the majority of allotments. The majority of these ranch operations use pastures containing public land throughout the year.

The number of AUMs authorized by the Kemmerer Field Office has declined slightly since 1985, due primarily to changes in ownership from mining operations and land exchanges, allotment boundary adjustments that have been made with adjoining BLM offices, and suspension of AUMs. Population growth and development is expected to continue throughout the planning area, which could result in a local decrease in AUMs because of a loss of surface acreage for livestock grazing.

Rangeland Health and Productivity

Livestock grazing can have both beneficial and adverse impacts on rangeland health and productivity. In general, rangeland health is most adversely impacted in areas where livestock congregate, such as areas with water, shade, and (or) more palatable forage; therefore, management is often geared toward

improving the overall distribution of livestock within an allotment. This is accomplished through implementing BMPs, developing AMPs or coordinated resource management plans, changing grazing systems, and implementing range improvement projects (i.e., fencing, water development projects, salt and mineral licks). Kovalchik and Elmore (1992) describe the compatibility of different livestock grazing systems with willow-dominated plant associations, similar to those found in some riparian areas of the planning area.

Livestock may congregate in areas where conditions are favorable, such as watering or shaded areas, or where fence lines abut. When livestock congregate for long periods, it can be detrimental to the soils and vegetation in the area. In addition to congregation areas, livestock movement transports seed and propagates of INNS, thereby expanding infestations of these species. Congregation areas, transport of INNS, and adverse impacts to vegetation from livestock and native ungulates have historically contributed to the challenge of managing rangeland health and productivity in the planning area.

Some benefits of livestock grazing on rangeland health include improving vegetative cover, plant vigor, and reducing INNS infestations. One tool used to decrease the extent of INNS in an area is to have livestock graze at an INNS area at a crucial point in the plant's life-cycle. For example, goats can graze thistle prior to seed set and cattle can graze areas infested with cheatgrass in early spring, thereby reducing the plant's vigor and making water and nutrients more available to native vegetation.

In 1985, the BLM established three categories for allotments to identify areas where management was potentially needed, as well as to prioritize workloads and the use of range improvement dollars. Allotments were classified as Improve Existing Resource Conditions (I), Maintain Existing Resource Conditions (M), or Custodial Management (C). When allotments in the planning area were originally categorized, resource conditions in some of the allotments placed in the "I" category were not necessarily in need of improvement. Criteria that were used to place allotments in the "I" category included the amount of public land present in the allotment; willingness of permittees/lessees to invest in management; opportunities for constructing range improvements; existence of grazing related resource conflicts; allotments having moderate-to-high forage production potential and production at low to moderate levels; identification by ranchers of the BLM opportunities for improvement in range condition; a static or downward range trends; livestock management that could be improved through water distribution; seasons of use or other factors; and the existence of opportunities for a positive economic return on public investments.

Currently, 39 allotments are classified as "I" (improve), 115 as "M" (maintain), and 67 as "C" (custodial) (Map 42). Some allotments are not assigned a category. The "I" and "M" category allotments contain approximately 1,361,104 acres of BLM-administered land, or 96 percent of the total acreage in the planning area. The majority of the allotments with an "I" designation in the planning area occur west and northeast of Kemmerer in Lincoln County and in the southeast corner of the planning area (south of Granger) in Uinta and Sweetwater counties. The majority of the allotments with an "M" designation occur south of Kemmerer in Lincoln and Uinta counties. In the past, allotments in the "I" category generally received top priority; however, with the current emphasis on evaluating rangeland health on a watershed basis, some management actions may be implemented on "M" or "C" category allotments to resolve problems within a watershed. Comparison of range condition data from surveys completed in the 1950s and 1960s and surveys completed in the 1980s and 1990s indicates the condition of public lands in the planning area has improved due to improved livestock management.

Changes in federal grazing regulations required the BLM to evaluate rangeland health and manage domestic livestock in accordance with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming,* approved August 12, 1997 (BLM 1998a). The six standards set forth (see sidebar) relate primarily to physical and biological features of the landscape and are intended to be within control

of the land manager and achievable by the user. These standards relate to all BLM resource programs. Rangeland health can be positively or negatively impacted by any resource program or resource use.

The standards are used to enhance sustainable livestock grazing and wildlife habitats while protecting watersheds and riparian ecosystems. Guidelines are specified in AMPs or agreements, but may not in themselves cause an allotment to meet the standards. The Kemmerer Field Office follows the guidelines identified in allotments with management plans and agreements. Current management strives to prevent overgrazing and a downward trend on all grazing allotments; however, the emphasis is on I and M category allotments.

Approximately 10 percent of the public lands in the planning area are assessed annually for rangeland health. By the end of FY 2004, 50 allotments totaling 477,824 acres were evaluated. Twenty-six allotments (280,238 acres) were found to meet rangeland health standards. The remaining 24 allotments (197,586 acres) did not meet one or more standards. In 2 of the 24 allotments not meeting standards, livestock were determined not to be the primary factor causing degradation of rangeland health. In the remaining 22 allotments not meeting rangeland health standards, past or present livestock use was determined to be the contributing factor. It is important to note that only specific areas (e.g., 15% or less of the allotment) of public land within the 22 allotments were failing rangeland health standards.

Standards for Healthy Rangelands in Wyoming

- ***Standard #1.*** Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.
- ***Standard #2.*** Riparian and wetland vegetation has structural, age, and species diversity characteristics of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.
- ***Standard #3.*** Upland vegetation on each ecological site includes plant communities appropriate to the site that are resilient, diverse, and able to recover from natural and human disturbance.
- ***Standard #4.*** Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitats. Habitats that support or could support threatened, endangered, species of special concern, or sensitive species are to be maintained or enhanced.
- ***Standard #5.*** Water quality meets state standards.
- ***Standard #6.*** Air quality meets state standards.

Other factors contributing to rangeland health degradation include roads channeling runoff into stream channels adding sediment and changing hydrology, culverts in roads causing headcuts, oil and gas development, and drought. The rangeland health standards most often not met were Standard #2, which addresses riparian and wetland areas, and Standard #3, which addresses upland plant communities. In upland communities, INNS, poor plant vigor, and composition of plant communities are contributing factors for not meeting Standard #3.

Where livestock grazing has been identified as contributing to an allotment failing rangeland health, standards, guidelines or BMPs have or will be implemented. The Cumberland/Uinta Allotment is an example where successful guidelines were used to improve grazing and ecological conditions. Historically, the Cumberland/Uinta Allotment has been season-long grazing use. Attempts to rotate livestock grazing in the Cumberland/Uinta Allotment have been made since 1993, primarily to address concerns about riparian resources on public lands. In 1993, the BLM decided to divide the allotment into 11 units. Based on the resource response since 1993, a long-term grazing management strategy was developed for the allotment. Working cooperatively with allotment permittees/lessees, WGFD, the Bear Lake Regional Commission, wildlife/recreation interests, mineral interests, and the Lincoln/Uinta County Extension Service and Weed and Pest, the BLM implemented range improvements to address rangeland health concerns. Prescribed burning, water developments, and cross-fencing to create smaller pastures, as well as a change in season of use to provide longer periods of rest, are management objectives for the

Cumberland/Uinta Allotment designed to improve conditions in the allotment. Monitoring is conducted to determine whether objectives are being met and if adjustments in management need to be made.

Over the last 40 to 50 years, an improvement in range condition has occurred due largely to improved grazing management practices; development of range improvement projects, such as fences and water developments; and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range condition generally are anticipated to continue under all alternatives based on vegetation treatment and range improvement projects and development of guidelines for those areas determined not to meet rangeland health standards. INNS is one factor that may adversely impact the improving trend.

Vegetation and rangeland improvement projects have been, and will continue to be, implemented on BLM-administered public lands. Between 1985 and 2004, approximately 430 acres per year were treated with prescribed burns. These projects typically included adjacent landowners and, therefore, encompassed a greater extent of land than reported; however, it is unknown how much more land would be impacted by these types of projects within the planning area. An estimated 1,950 acres per year were burned due to wildland fire between 1985 and 2004. Both planned (i.e., prescribed) and unplanned (i.e., wildland) fires typically are beneficial to rangeland health, livestock production, wildlife, and watershed health in the long-term. The BLM's policy requiring deferment of livestock grazing for two growing seasons following planned vegetation treatments and unplanned fires has and will continue to adversely impact livestock producers in the short term.

Rangeland improvement projects can serve as management tools or BMPs to control or improve livestock distribution and use within an allotment. These projects consist primarily of fences, reservoirs, springs, water wells, and vegetative treatments. When properly implemented, rangeland improvement projects assist in maintaining or improving rangeland health and increase forage production. On average, the BLM completes 11 to 12 new range improvement projects per year to meet specific management goals and objectives.

Management challenges facing livestock grazing in the planning area include balancing multiple resource uses, such as wildlife use of forage and wildlife compatible fences; ongoing coordination with ranchers, the public, and interested stakeholders; the spread of INNS; livestock grazing management strategies that improve "I" category allotments and address long-term monitoring needs; and having sufficient information to analyze resource capabilities to meet active permitted use of each allotment, seasonal use needs of operators, and rangeland health standards. Existing challenges in the planning area also include meeting the standards for rangeland health, controlling livestock access and season of use, limiting soil erosion, maintaining diverse vegetation and sufficient forage, providing sufficient water, managing the relatively small and isolated parcels of public lands, managing the distribution of livestock, managing potential conflicts with recreation and oil and gas development, and enforcement of unauthorized use. Management actions designed to address these challenges are incorporated in the alternatives that are described in more detail in Chapter 2.

3.6.5 Recreation

Federal lands within the planning area provide a broad spectrum of outdoor opportunities that afford visitors the freedom of recreational choice with minimal regulatory constraints (Map 43). Recreational opportunities are offered to the public on all BLM-administered lands within the planning area where legal access exists. Public access is more common in the western portion of planning area.

The BLM Kemmerer Field Office recreation program has the responsibility for managing dispersed recreation throughout the approximately 1.4-million acres in the planning area with minimal regulatory constraints, primarily enacted for purposes of public safety and resource protection. Occurring in combination with other resource activities, dispersed recreation includes, but is not limited to, sightseeing,

touring, photography, wildlife viewing, floating, mountain biking, camping, fishing, and hunting. In addition, there are numerous NHTs on public lands that receive varying levels of use. NHTs are addressed in the Heritage Resources section of this document. Using OHVs in the collecting of shed antlers is an increasingly popular recreational and commercial activity. This activity has adversely affected wintering herds of elk and mule deer. OHV use in the winter on crucial winter ranges has become a problem because it adds to the stress level of wintering wildlife and has caused the abandonment of some winter range by elk and deer. OHV use is addressed in the Off-Highway Vehicle section of this document. These recreational opportunities are available to the public on most BLM-administered lands within the planning area.

In addition to general dispersed recreation, the Kemmerer Field Office manages several developed recreation sites with widely varied levels of development ranging from minor improvements for parking to multisite-hosted campground facilities. Most of the currently organized campground areas (Fontenelle Creek, Slate Creek, Weeping Rock, and Tail Race campgrounds) are located on U.S. Bureau of Reclamation (USBR) lands but managed by the BLM. Fontenelle Reservoir, also on USBR lands, in the northeast corner of the planning area, is used for boating, fishing, camping, and hunting. The Pine Creek Canyon campground is located on BLM-administered lands. The BLM also provides for use of an existing snow machine trail system, cross-country ski trail, and OHV hill-climb area.

Recreational Use Patterns

In the Kemmerer planning area, it is estimated that there are 160,000 recreational visits per year. A recreational visit is defined as a visit to BLM-administered lands and waters by a person for the purpose of engaging in any recreation activity, except those that are part of or incidental to the pursuit of a gainful occupation, whether for a few minutes, a full day, or longer. Visitor numbers for hunting and fishing (the most intensive recreational use planning area wide) also have been generated. These numbers have remained fairly constant over time because they depend on wildlife population numbers and available licenses and, therefore, do not depict known increasing recreational trends. The numbers for hunting and fishing, therefore, generally reflect the magnitude of recreational demand on public lands. Table 3-30 illustrates hunting and fishing recreational days for Wyoming, public lands in Wyoming, and public lands within the Kemmerer Field Office for 1998 through 2001. These estimates were derived from the percentage of BLM-administered land within the state and hunting and fishing recreation days. The recreation days used in these calculations were provided by the WGFD (WGFD 2002). The methodology was developed by Romaniello et al. in 2000. The results were compared to a USFWS recreational survey conducted in 1996 and shown to be reliable estimates of recreational use on public lands.

Table 3-30. Hunting and Fishing Recreation Days[1]

Year	Wyoming	BLM (public lands statewide)	KFO (public lands only)
1997	5,119,973	1,464,312	111,287
1998	5,670,961	1,621,894	123,263
1999	5,872,695	1,679,590	127,648
2000	5,865,240	1,677,458	127,486
2001	5,682,137	1,625,091	123,507

Sources: BLM 2003a; WGFD 2002
[1]Recreation days are defined by WGFD as whole or partial days of hunting or fishing.
BLM Bureau of Land Management
KFO Kemmerer Field Office

Literature reviews show that increasing recreational use trends are expected to continue (Wyoming State Office of Travel and Tourism 2004; Haas 2002; Cole 1996), which will increase the complexity of managing dispersed recreation.

Recreation Management

Management prescriptions on public lands emphasize monitoring, education, and enforcement to reduce user conflicts and provide resource protection. Monitoring and enforcement of dispersed recreation is limited, especially in areas with a small percentage of public lands or limited access.

As needs arise and resources allow, the BLM places signs to identify public and private land boundaries, interprets resources, and provides regulatory and informational kiosks in high use areas. Detailed information is available to the public through informational pamphlets, land ownership maps, and online websites. Moreover, the BLM promotes educational programs that inform the public and increase awareness. Some examples of these programs include Tread Lightly, Leave No Trace, and Operation Respect.

In addition to managing lands for general dispersed recreational activities, the Kemmerer Field Office also administers Special Recreational Permits (SRPs) for specific nonexclusive commercial or competitive recreational activities. These permits are issued to provide a mechanism to accommodate commercial recreational use, protect natural and cultural resources, and provide a mechanism to accommodate commercial recreational uses. Permits are processed on a case-by-case basis. The five general categories of SRPs are commercial, competitive, vending, individual or group use in special areas, and organized group activity and event use (BLM 2003f). Lengths of permits depend on activities proposed, the area in question, and the past record of the potential permittee. Permits can be issued for periods ranging from 1 to 5 years.

Currently, SRPs issued by the Kemmerer Field Office are to commercial and competitive event organizers that provide recreational opportunities or services without permanent facilities and for periods of less than 6 years. There are 13 commercial outfitters operating in the Kemmerer Field Office. Permits are for hunting guides, snowmobile riding, and mountain bike races.

The Special Recreation Management Area (SRMA) is an area with a commitment to provide specific recreational activities and opportunities. The Kemmerer Field Office currently does not have areas identified as SRMAs within the planning area, but a recreation area management plan continues to be proposed for the Pine Creek Canyon area. The entire planning area is managed as an Extensive Recreation Management Area (ERMA).

Management activities are designed to ensure the continued availability of outdoor recreation opportunities sought by the public and that are not readily available from other public or private entities. These management actions and prescriptions emphasize monitoring, enforcement, and mitigation to reduce user conflicts and provide resource protection. Monitoring and enforcement of dispersed recreation is limited, however, especially in areas with a small percentage of public lands or limited access.

3.6.6 Travel Management

Transportation management involves the infrastructure and legal rights to provide people the opportunity to use and travel to and through specific lands within the planning area. The emphasis of the following discussion is on BLM's travel management program, which includes providing means for legal access and maintenance and development of various transportation facilities. The Kemmerer Field Office transportation program manages legal access to and across public lands utilized for recreation, renewable and nonrenewable energy development, range management, public access, and communication site management. Travel management includes travel ways, travel management, and travel systems.

Acquisition of lands and interests in lands, and the tools used to acquire access, are discussed in detail in the Lands and Realty section of this document. ROWs to meet transportation needs are addressed in the Rights-of-Way and Corridors section of this document. OHV and related issues are discussed in the Off-highway Vehicles section of this document.

Access is acquired using several different tools, including purchase, exchange, reciprocal ROW, donation, and condemnation. ROW reservations are used to establish and record access roads across private land. Cooperative agreements with landowners are used on occasion, but do not provide long-term legal public access. Both the transportation and ROW programs are active and receive a great deal of public interest because access is important for resource users and managers.

The primary components of the transportation network and facilities in the planning area include roads, railroads, and airports. A large number of the BLM system roads that currently provide access to public lands were first built and maintained by the oil and gas industry. These roads are chiefly improved dirt roads. Not all roads are maintained. Roadways managed by BLM within the Kemmerer Field Office are limited to four easements. The key components of the transportation network within the planning area are presented in Volume 2, Map 1.

The transportation infrastructure within the planning area is closely related to historic trails, as many automobile routes and railroads eventually paralleled some of the trail routes. At the beginning of the twentieth century, there was a dramatic increase in Wyoming roadways as a result of increased automobile use and the burgeoning oil and gas industry. The highways of this era were named rather than numbered and frequently followed rail lines and rivers.

The planning area is crossed by several primary and secondary highways that connect most communities, as well as a series of county roads that provide the general public access to remote locations within the planning area. U.S. 30 South from Granger to Evanston to Salt Lake City, was the original Abraham Lincoln Memorial Highway. U.S. 30 North traveling through Kemmerer was never designated historically as the Lincoln Highway. U.S. 89 runs north-south through the northwest edge of the planning area from the Idaho State line on the south end to Alpine Junction in the north, where it passes out of the planning area. U.S. 189 runs south to north-northeast, passing through Kemmerer and a large part of the planning area. I-80 crosses the southern portion of the planning area, entering from the west at the Idaho border. It runs roughly west-southwest to east-northeast, passing though Evanston and Lyman before exiting the planning area approximately 15 miles east of Granger.

Rail travel through Wyoming began with the construction of the UPRR in the late 1860s. The federal government subsidized developing rail lines with substantial land grants that were, in turn, developed for mineral, agricultural, and tourist potential. Passenger service declined dramatically in the 1980s and there is not regularly scheduled passenger rail service in the region. However, the railroad is still the largest carrier of bulk freight in Wyoming, shipping coal, agricultural products, and other goods.

The planning area is home to several public and private airports. The towns of Evanston, Afton, Kemmerer, Fort Bridger, and Cokeville have small municipal airports. Scheduled commercial air service is available in Rock Springs, Salt Lake City, and Jackson Hole. Many small airstrips, located on public and private lands, are scattered throughout the region. For the most part, these facilities were developed by local ranchers to support their ranch operations. Those on public land are available for use by the public.

Much of the transportation infrastructure necessary within the planning area is in place, but the need for additional major road facilities has not been identified. Highways in the planning area generally are considered to be in good condition and have excess capacity (most of the attention to infrastructure is aimed at reconstruction of aging or dilapidated facilities and routine maintenance) (BLM 1997c).

Management challenges identified for the transportation management program in the Kemmerer Field Office are based, in part, on historic activities and existing conditions and trends. Management challenges include the lack of legal public access to some parcels of public land; unrestricted access to areas that may pose a threat to public health and safety (e.g., abandoned mine lands) or significant resource values (e.g., NHTs and crucial winter range); maintenance of current legal public access routes to public lands; many legal public access routes not identified by information and (or) direction signs; increased road use based on anticipated increases in oil and natural gas activity and recreational use demand; expansion of the road network to support anticipated increases in oil and natural gas operations in compliance with multiple-use concepts within the FLPMA; roads that are no longer needed; and road design and construction considering other resource programs to minimize impacts.

The Kemmerer Field Office transportation management program is aimed at managing access to and across the public lands. Please refer to the Lands and Realty section of this document for related information on land use authorizations and land-tenure adjustments. Transportation management areas may be designated and a travel management plan may be developed during RMP implementation to address management challenges. Management actions designed to address the challenges identified in this section are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.7 Off-Highway Vehicles

For regulatory purposes, 43 CFR 8340 defines an OHV as "any motorized vehicle capable of or designated for, travel on or immediately over land, water, or other terrain." The majority of OHV use on public lands occurs on unpaved roads and two-track trails. The common perception of OHVs is that they generally are all-terrain vehicles, snowmobiles, motorcycles, and dune buggies. However, in the planning area, the most common vehicles used are four-wheel drive trucks and sport utility vehicles. The national objectives for OHV management are to provide for OHV use while protecting natural resources, promoting safety of all users, and minimizing conflicts among the various users of public lands. Travel management is an ongoing process and includes inventorying, rerouting, upgrading, and closures of roads, as well as the addition of roads and trails.

OHV Use within the Planning Area

Road networks within the planning area comprise a series of county roads, BLM-maintained roads, two-track trails, and snow machine trails. The maintenance and use of these travel ways has become an integral part of public land management, as these roads are used for both recreational and nonrecreational purposes.

Typical recreational OHV activities within the planning area include enduro races, trial competitions, all-terrain vehicle and motorcycle trail riding, and snowmobiling. OHV use, in itself, has become a popular method to exploring public lands. In addition, OHV use provides access for nonmotorized recreational purposes, such as fishing, hiking, mountain biking, horseback riding, and primitive camping opportunities. People with disabilities may be allowed to travel on OHVs in otherwise closed areas on a case by case basis. This would require a request to the Kemmerer Field Office to initiate the exception.

Nonrecreational OHV use of the planning area includes agricultural management, energy development, and land management activities. OHVs also are used for noncommercial collection of decorative rock and native plant materials. Employees of government agencies, ranchers, timber companies, energy companies, and utility providers are permitted users who utilize OHVs to access and maintain the infrastructure required for the continued operation and maintenance of their facilities. The BLM uses OHVs for range inspections, vegetation treatments, surveying and mapping, inventories, monitoring, fire suppression, project construction, and maintenance.

The BLM has established OHV area designations in accordance with the BLM Land Use Planning Handbook requirements and 43 CFR 8342.1. These designations outline management prescriptions and set restrictions on OHV use. Possible OHV designations are open, closed, or limited (see Glossary).

OHV Use and Environmental Concerns

The OHV designations for the majority of public lands within the planning area are currently either "limited to existing roads and trails" or "limited to designated roads and trails." OHV operators may go off of roads and trails to perform necessary tasks. Snow machine use in the Pine Creek Canyon is limited to groomed trails. There are 23 miles of groomed snow machine trails in the planning area. The cross-country ski trail is not part of the groomed snow machine trails system and has been identified as an area of conflict between snowmobilers and cross-country skiers. Snow machine use is limited to available dates prior to January 1 in crucial big game winter range areas and is prohibited in most of the Raymond Mountain WSA, except for Raymond Basin. While these designations provide for a wide variety of OHV use, and there are a number of travel routes on public lands throughout the planning area, the majority of recreational OHV use occurs in areas with legal and physical access in conjunction with large blocks of public lands. Areas where OHV access is restricted or substantially limited include the Raymond Mountain WSA and the seasonal closure of 287,160 acres in crucial big game winter range from January 1 to April 30.

The popularity and use of OHVs has grown substantially in a relatively short period of time. Areas that were once infrequently visited are now popular places for recreational touring and other OHV-related activities. However, off-road or other inappropriate use of these vehicles can cause environmental degradation and increased conflicts among user groups. The Green Hill is an area of conflict between OHV users and residents of the adjacent neighborhood. Another OHV conflict area exists within the boundary of Raymond Mountain WSA where two cherry-stem roads remain open for use, but are used by 4-wheelers to enter into the WSA and then travel illegally throughout the WSA.

Certain environments are more susceptible to OHV damage, including crucial winter ranges, wildlife breeding areas, riparian habitats, and areas with steep slopes or sensitive soils. OHV use in the planning area is expected to continue. The lack of appropriate signage, a shortage of law enforcement personnel, the increase in OHV use throughout the planning area, and a general lack of understanding of land use ethics have increased inappropriate uses of OHVs on federal lands and represent management challenges for the BLM. Management actions to address these challenges are included as part of the alternatives described in Chapter 2.

3.6.8 Visual Resources Management

The purposes of VRM are to manage the quality of the visual environment and to minimize the visual impact of development activities, while maintaining the viability of all resource programs. VRM involves applying methods for evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts. A summary of the BLM VRM program follows:

- Lands have different visual values that warrant different management.
- The VRM inventory is used to systematically identify and evaluate visual resources based on scenic quality, visual sensitivity, and distance zones. The evaluation produces a numerical index value.
- The index values correspond with management classes incorporated into the RMP process. Each management class has a management objective.

- Visual values are considered along with all other resource values during the RMP process when determining VRM objectives. Management decisions reflect the multi disciplinary analysis.
- VRM objectives established through the RMP process provide the limits for the design and construction of all surface-disturbing activities.
- Proposed projects are analyzed using the Contrast Rating Process to determine if management objectives would be met and to identify mitigation measures to minimize visual impacts.

VRM in the planning area focuses on values and resources in broad areas with vast vistas of native landscapes and unique areas of spectacular quality. Examples of areas with high visual values include Raymond Mountain, Rock Creek Ridge, and Slate Creek Ridge. Examples of key resources include Fossil Butte National Monument and the Green River.

Such visual resource values are defined through the implementation of the BLM's VRM methodology, beginning with a classification system comprising three phases: inventory (as outlined in BLM Handbook 8410-1, *Visual Resource Inventory and Evaluation*); establishment of management classes through land use plans; and analysis of management actions to ensure compliance (as outlined in BLM Handbook 8431-1, *Visual Contrast* Rating). Current VRM classes for portions of the planning area were established in 1986 (VRM Class map). The acreage in each VRM class are identified in Table 3-31 and the spatial distribution of these acreages are shown on Map 54.

VRM classes I through IV range from completely natural landscapes to landscapes containing extensive human modification, respectively. Boundaries and corresponding acreages are subject to change as more inventories and evaluations are conducted.

Table 3-31. Current VRM Classes, Associated Objectives, and Acreage of BLM-Administered Surface Lands

Management Class	Class Objective	Acreage
Class I	To preserve the existing character of the landscape. The level of change to the characteristic landscape must be very low and must not alter or attract attention.	0
Class II	To retain the existing character of the landscape. The level of change to the characteristic landscape must be low.	129,771
Class III	To partially retain the character of the landscape. The level of change to the characteristic landscape must be moderate.	378,979
Class IV	To provide for management activities that requires major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.	878,411

Heavily impacted areas are normally populated with highly visible large-scale facilities or exhibit obvious surface disturbance. High-profile visual intrusions involve concentrated development, such as buildings, industrial facilities, infrastructure associated with oil and gas fields, quarries, and ROW involving surface disturbance. Surface-disturbing activities associated with these areas are readily noticeable due to the amount of contrast with the representative landscapes.

Low-profile visual intrusions include range improvements, fences, and two-track roads, and are found throughout the planning area. Individually, these intrusions provide minimal disturbance to visual resources; however, the cumulative impact of these intrusions, over time, can disrupt the overall character of the landscape and adversely impact visitor experience.

According to the established VRM classes BLM-administered surface lands include no areas of Class I land, 129,771 acres of Class II land, 378,979 acres of Class III land, and 878,411 acres of Class IV land.

Resource Condition and Trends

The condition of visual resources in the planning area varies greatly depending on location, the amount of activity, and the overall character of the landscape. Some areas have been impacted by large-scale development, grazing practices, and recreational activities, while other portions have remained relatively untouched.

In addition to describing the VRM classes within the planning area, another important aspect of VRM includes identifying rehabilitation areas. Rehabilitation areas, in which the existing visual intrusions exceed acceptable levels and class objectives, should include visual resource mitigation measures. An example of a potential rehabilitation need is the transmission line that crosses a Class II area being managed for the presence of NHTs.

A collection of isolated parcels in the northern portion of the planning area, known as Star Valley, were excluded from consideration during the 1986 Kemmerer RMP effort. As a result, no VRM class determinations were made for these areas.

Public concerns, including the quality of recreational experiences on public lands; protecting landscapes along NHTs; scenic values and scenic quality; and the costs of development for mitigation, present management challenges for the BLM. Other management challenges for VRM include the environmental consequences of concentrated recreational use, degradation caused by widespread use of OHVs on public lands, overlap of NHTs and utility corridors, effective mitigation along travel routes including Back Country Byways, data supporting the validity of current VRM classes within the Kemmerer planning area, and monitoring the long-term impact of management standards and practices. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

The BLM plans to continue VRM according to all laws, regulations, and policies, and to maintain the overall integrity of visual resources, while allowing for modification and changes to occur to meet other resource objectives. This would include the evaluation and potential reclassification of areas according to new data. The Kemmerer Field Office also recognizes the need to ensure VRM is consistent with other land use plans within and adjacent to the planning area (Wasatch National Forest and Bridger Teton National Forest).

3.7 Special Designations

This section describes areas existing, proposed, recommended, or eligible for consideration as ACECs, Research Natural Areas (RNAs), Other Management Areas (MAs), Wild and Scenic Rivers (WSRs), WSAs, or Back Country Byways.

3.7.1 Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas

Pursuant to the FLPMA of 1976, Section 1702(a), an ACEC is defined as an area "within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards." While an ACEC may emphasize one or more unique resource, other existing multiple-use management can continue within an ACEC, so long as the uses do not impair the values for which the ACEC was designated. These areas are managed pursuant to BLM Handbook Section 1613 (BLM 1988b). Raymond Mountain is the only ACEC currently designated in the planning area.

RNAs protect natural ecosystems for the purposes of scientific study and education and for maintenance of biological diversity. They serve as a baseline or reference areas and help answer resource management questions and are managed to maintain the natural features for which they were established and to maintain natural processes. Because of the emphasis on natural conditions, the areas provide the opportunity to study ecosystems or their component parts and to monitor succession and other long-term ecological change. Nonmanipulative research and monitoring activities are encouraged in RNAs and can be compared with manipulative studies conducted in other areas. Currently no RNAs are designated in the planning area.

MAs, ACECs, SRMAs, WSAs, RNAs, or WSRs are areas with unique characteristics that warrant managing in a manner other than standard management actions and activities to protect those characteristics. An MA may emphasize one or more unique resources, but other existing multiple-use management may continue within an MA, so long as the uses do not impair the values for which the MA was established. There are no MAs currently identified in the planning area.

Fourteen areas were nominated for ACEC consideration during the scoping process of the RMP revision. Nine of the nominated areas met both the relevance and importance criteria (identified in BLM Handbook Section 1613) and are carried forward for additional consideration and analysis in the RMP revision. In addition, two of the nominated areas, which did not meet the relevance and importance criteria for ACECs, were carried forward for additional analysis as MAs.

Table 3-32 summarizes areas existing, proposed, or eligible for consideration as ACECs, MAs, or RNAs. Also included in Table 3-32 are the resource values of concern identified for each area.

3.7.1.1 Existing Special Designations

Raymond Mountain ACEC

The Raymond Mountain ACEC was designated in 1982 as part of the Pioneer Trails Management Framework Plan and lies within the Raymond Mountain WSA and adjacent to other federal land and state and private lands (Map 61). The Raymond Mountain ACEC includes 12,667 acres of BLM-administered surface and mineral estate along the northwestern edge of the planning area and lies wholly within the area managed by the Thomas Fork HMP (BLM 1979). The Raymond Mountain ACEC designation is based on a recommendation within the Thomas Fork HMP to designate aquatic and riparian habitats of the Thomas Fork drainage as an ACEC to amplify management needs of the Bear River (Bonneville) cutthroat trout (BLM 1982), a BLM sensitive species. Referring to habitat for the Bonneville cutthroat

trout in this area, the 1979 Thomas Fork HMP indicates, "overall, 73 percent of the fisheries habitat in this drainage is in an apparent declining trend." In addition to brush spray projects, BLM 1979 indicates "… intensive utilization of riparian vegetation by livestock, and beaver historically resulted in reduced channel stability, accelerated stream bank erosion, channel downcutting, lower water tables, and disclimax in riparian vegetation communities." Cooperative management strategies developed with local livestock permittees/lessees have provided additional protections for sensitive resources in the area through livestock reductions and season of use restrictions. Livestock grazing currently is permitted within the Raymond Mountain ACEC.

Table 3-32. Existing and Proposed Areas Designated, Proposed, or Eligible for Consideration as ACECs, MAs, or RNAs in the Kemmerer Planning Area

Existing or Proposed Areas	Designation or Consideration	Resource Value(s) of Concern
Existing		
Raymond Mountain	ACEC	Protects the needs of the sensitive Bonneville cutthroat trout and identifies priority for riparian management.
Proposed		
Raymond Mountain Expansion	ACEC	Proposed as an expansion to the existing ACEC to protect sensitive wildlife habitats and winter ranges, as well as scenic values.
Special Status Plant Species Habitat	ACEC or RNA	Special status plant species populations - habitats
Cushion Plant Communities	ACEC or RNA	Cushion plant populations - habitats
Bridger Butte	ACEC	Protects sensitive cultural values, including Native American sensitive sites, NHTs and other historic and associated sites, and special status plant species.
White-Tailed Prairie Dog Complexes	ACEC	Protects a keystone sage-steppe species.
Dry Fork Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Upper Tributary Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Lower Tributary Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Fossil Basin	ACEC	Proposed to protect and highlight the paleontological deposits in the area, as well as scenery and views from Fossil Butte National Monument.
Rock Creek Tunp	MA	Protect sensitive overlapping of wildlife habitats (big game winter ranges and migration corridors, greater sage-grouse yearlong habitats, sagebrush obligate and special status species habitats); cultural values, including NHTs and associated sites; and special status plant species.
Bear River Divide	MA	Protect sensitive overlapping of wildlife habitats (big game winter ranges and migration corridors, greater sage-grouse yearlong habitats, sagebrush obligate and special status species habitats); cultural values, including NHTs and associated sites; and special status plant species.

ACEC Area of Critical Environmental Concern
RNA Research Natural Area
MA Management Area

The BLM manages the Raymond Mountain watershed to protect the needs of the sensitive Bonneville cutthroat trout, which is in danger of being extirpated from the drainage. The Raymond Mountain ACEC provides yearlong habitats for all life stages of the Bonneville cutthroat trout and other native nongame aquatic species (WGFD 2004b).

Management of the Raymond Mountain ACEC benefits riparian areas. For example, no surface-disturbing activities are allowed in riparian habitats within the ACEC. In addition, two-track roads descending from the IGO Speedway into Raymond Canyon and the Raymond Canyon road are closed to OHV use. Historically, OHV use in this area caused soil erosion and disturbed aquatic habitat of Raymond Creek (BLM 1982). A seasonal closure of these roads exists within big game winter range during severe climatic conditions from December 1 to May 15 (BLM 1982). One mile of the Huff Creek stream bank has been stabilized and two exclosures have been installed.

Currently within the ACEC, no oil and gas leases or mining claims exist. The Raymond Mountain ACEC exhibits no to low development potential for oil and gas. Coal occurrence potential within the Raymond Mountain ACEC is low to moderate with no development potential. Most of the Raymond Mountain ACEC exhibits moderate-to-high phosphate occurrence potential and low trona occurrence potential.

3.7.1.2 Proposed Special Designations

Raymond Mountain Expansion ACEC

Within the planning area, the proposed 33,928-acre Raymond Mountain Expansion ACEC includes 27,026 acres of BLM-administered surface, 28,430 acres of federal mineral estate, and is located north of Cokeville (Map 62). This area is proposed as an expansion to the existing ACEC to protect sensitive Bonneville cutthroat trout habitat, riparian resources, wildlife habitats and winter ranges, as well as scenic values (VRM Scenery A qualities).

The area includes sensitive fish and wildlife species and is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 2 for the Pinedale Regional Fish Division and Area 10 for the Green River Regional Wildlife Division. The WGFD identified areas throughout Wyoming in greatest need of attention and (or) restoration and labeled these priority areas. The *Strategic Habitat Plan* (WGFD 2001) identifies goals, objectives, and strategies to restore these priority areas. Bonneville cutthroat trout and other native nongame aquatic species habitats occur within the proposed expansion area. The area contains crucial winter range for the Wyoming Range mule deer, West Green River elk, and Lincoln moose herd units (WGFD 2004b). In addition, the area also includes a migration corridor for mule deer, and while not overlapping, lies adjacent to several active greater sage-grouse leks. The area also encompasses part of an LAU, the Wyoming Grizzly Bear Management Area, and the Wyoming Audubon Society Important Bird Area.

Most of the Raymond Mountain Expansion ACEC area exhibits low oil and gas development potential. Occurrence potential for coal and phosphate within the Raymond Mountain Expansion ACEC is low to moderate, whereas occurrence potential for trona is low.

Special Status Plant Species Habitat ACEC/RNA

Within the planning area, no areas of special status plant species habitats are currently designated as ACECs or RNAs. However, alternatives to current management identify up to 907 acres of the planning area (774 acres of BLM-administered surface and 793 acres of federal mineral estate) containing special status plant species habitats as an ACEC and (or) an RNA. The proposed areas include known populations for any, or all, of eight special status plant species known to exist in the planning area. Particular species of concern include Trelease's racemose milkvetch, Entire-leaved peppergrass, Large-

fruited bladderpod, Western bladderpod, Prostrate bladderpod, Beaver Rim phlox, Tufted twinpod, and Dorn's twinpod.

Special status plant species habitats are located in multiple locations within the planning area including areas subject to OHV use, mineral development, and livestock grazing. The majority of the proposed ACEC/RNA areas exhibit low or moderate oil and gas development potential and none of the proposed areas exhibit high oil and gas development potential. Occurrence potential for coal within the proposed ACEC/RNA areas is low and most of the areas are classified as having a low to moderate occurrence potential for phosphate. The occurrence potential for trona within the proposed ACEC/RNA areas is low.

Cushion Plant Communities ACEC/RNA

Within the planning area, no areas of cushion plant communities are currently designated as ACECs or RNAs. However, alternatives to current management identify up to 62 acres of the planning area (all BLM-administered surface and federal mineral estate) (see maps 62 and 64). The proposed ACEC and RNA areas comprise known populations and seven endemic species. Cushion plant communities are sparsely vegetated areas with low-growing, mat-like tufts of vegetation with bare soil and gravel between the individual plants. Cold winters, little rainfall, and strong winds contribute to the development of these specialized communities. The communities are vulnerable to surface disturbance and have a slow recovery time. Usually 50 years or more are required to restore the communities to their original native state after disturbance. The cushion plant communities frequently contain uncommon and regional endemic plant species. Species composition varies from one community to another. Typical associates found in these areas include different species of phlox, twinpods, bladderpods, and legumes.

The area northeast of Kemmerer proposed for inclusion in the ACEC includes active livestock grazing and oil and gas development. The proposed ACEC/RNA area exhibits moderate oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

Bridger Butte ACEC

Within the planning area, the Bridger Butte area is not currently designated as an ACEC. However, alternatives to current management identify up to 1,127 acres of the Bridger Butte area as an ACEC. The proposed ACEC is located south of I-80 between Lyman and Evanston (see maps 62 and 64) and is intended to protect sensitive cultural values, including NHTs and associated sites. Historical accounts and emigrant diaries repeatedly refer to Bridger Butte as an important landmark that signified their approach to Fort Bridger, an important rest stop on the journey west. In addition, several Native American tribes have identified Bridger Butte as an area of tribal significance (BLM No date).

The area includes habitats for special status plant species populations, including tufted twinpod, prostrate bladderpod, Maybell locoweed, and Payson beardtongue. Rare animals inhabiting the area include the Uinta ground squirrel and Idaho pocket gopher. In addition, the area of the Blacks Fork includes populations of roundtail chub and flannelmouth suckers (WGFD 2004b). The proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

White-Tailed Prairie Dog Complexes ACEC

Within the planning area, white-tailed prairie dog complexes are not currently designated ACECs. However, alternatives to current management identify three areas up to 30,913 acres (30,913 acres of BLM-administered surface and 28,739 acres of federal mineral estate) of white-tailed prairie dog complexes within the planning area as ACECs. The proposed areas encompass white-tailed prairie dog complexes a minimum of 100 acres in size and the proposed designation is intended to protect white-tailed prairie dog habitats. In Wyoming, the white-tailed prairie dogs are considered sensitive species by the BLM. In addition, prairie dog complexes provide habitats for the burrowing owl (also a BLM

sensitive species) and the endangered black-footed ferret. The proposed ACECs occur in multiple locations within the planning area, primarily in the checkerboard land pattern area (Map 62).

These areas can occur in areas of moderate-to-high oil and gas and trona development; however, most of the proposed areas exhibit low oil and gas development potential. Occurrence potential for coal for most of the proposed areas is low, with less than 500 acres each classified as moderate or high. In addition, most of the proposed areas also have low occurrence potential for phosphate and trona.

Dry Fork Watershed ACEC

Within the planning area, Dry Fork Watershed currently is not designated an ACEC. However, alternatives to current management identify up to 4,690 acres (3,172 acres of BLM-administered surface and 4,054 acres of federal mineral estate) within the planning area as an ACEC. The proposed Dry Fork Watershed ACEC is depicted on Map 62 and extends from its confluence with the Smiths Fork River upstream to the Bridger-Teton National Forest boundary. The area provides yearlong habitats for all life stages of core conservation populations of Bonneville cutthroat trout as well as other native nongame aquatic species (BLM 2004p). The *Conservation Agreement and Strategy for Bonneville Cutthroat Trout, in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for managing these species. Habitat for the leatherside chub is also present in the area. The proposed Dry Fork Watershed ACEC also provides moose winter range and yearlong habitats for greater sage-grouse; lynx and wolverine also could inhabit the area.

Livestock grazing occurs throughout the proposed ACEC. Relatively small portions of the area are leased for oil and gas, exhibiting low oil and gas development potential. Coal occurrence potential within the proposed ACEC is moderate and most of the area is classified as having low occurrence potential for phosphate and trona.

Upper Tributary Watershed ACEC

Within the planning area, the Upper Tributary Watershed currently is not designated as an ACEC; however, alternatives to current management identify up to 5,595 acres (4,291 acres of BLM-administered surface and 4,924 acres of federal mineral estate) within the planning area as an ACEC. The proposed Upper Tributary Watershed ACEC is depicted on Map 62 and includes the Upper Smiths Fork River from the confluence of Hobble Creek with the Smiths Fork and West Fork Smiths Fork, Trespass Creek, Porcupine Creek, and Hobble Creek watersheds to the Bridger-Teton National Forest boundary.

The area provides yearlong habitats for all life stages of core conservation populations of Bonneville cutthroat trout, as well as other native nongame aquatic species, including the leatherside chub. The *Conservation Agreement and* Strategy *for Bonneville Cutthroat Trout in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for managing these species. The area provides moose and elk winter range and is a major mule deer migration corridor. Portions of the area provide breeding and nesting habitats for greater sage-grouse; lynx and wolverine also could inhabit the area. The majority of the proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

Lower Tributary Watershed ACEC

Within the planning area, Lower Tributary Watershed currently is not designated an ACEC. However, alternatives to current management identify up to 1,371 acres (1,351 acres of BLM-administered surface and 1,359 acres of federal mineral estate) within the planning area as an ACEC. The proposed Lower Tributary Watershed ACEC is depicted on Map 62 and includes Coal Creek and Sawmill Creek watersheds. The proposed boundary is from the confluence with Smiths Fork River to the Bridger-Teton National Forest boundary. The area provides yearlong habitats for all life stages of core conservation

populations of Bonneville cutthroat trout, as well as other native nongame aquatic species, including the leatherside chub. The *Conservation Agreement and Strategy for Bonneville Cutthroat Trout in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for the management of these species.

The area provides moose and elk winter range and is a major mule deer migration corridor. Portions of the area provide breeding and nesting habitats for greater sage-grouse; lynx and wolverine also could inhabit the area.

The majority of the proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal. The proposed ACEC exhibits moderate occurrence potential for phosphate and trona.

Fossil Basin ACEC

Within the planning area, the Fossil Basin area is not currently designated as an ACEC; However, alternatives to current management identify up to 451,452 acres (201,660 acres of BLM-administered surface and 250,146 acres of federal mineral estate) of the Fossil Basin within the planning area as an ACEC and (or) MA. The Fossil Basin ACEC could include areas within the Fossil Basin that extend from well north of the current Fossil Butte National Monument to the southern boundary of the field office area, as defined by a USGS geologic map (Koespel 2004). A nomination from the Sierra Club for a Fossil Lake ACEC suggested a boundary that encompasses the viewshed area surrounding the National Monument and possibly other fossil-bearing areas as defined by a USGS geologic map by (Koespel 2004). The proposed area is intended to protect fossil resources. The area contains world-renowned fossil resources, especially high quality vertebrate fossils. Additional information regarding the fossil resources within the Fossil Basin can be found in Buchheim and Eugster (1998) and McGrew and Casilliano (1974).

The majority of land within the proposed ACEC exhibits low oil and gas development potential; however, some acreage exhibits moderate to high oil and gas development potential. Similarly, coal and phosphate occurrence potentials within the proposed ACEC are low to high. Occurrence potential for trona within the proposed area is low.

Rock Creek/Tunp MA

Within the planning area, the Rock Creek/Tunp area currently is not identified for other management; however, alternatives to current management identify up to 63,278 acres of the Rock Creek/Tunp area as an MA. The proposed area is located northwest of Kemmerer (maps 62 and 64) and is intended to protect sensitive overlapping wildlife habitats, cultural values, NHTs and associated sites, and special status plant species. The area includes significant physical traces of the Oregon-California NHT that retain historic scenic qualities. This area also provides habitats for, and identified locations of, several special status plant species.

This area is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 1 for both the Green River Regional Wildlife Division and the Pinedale Regional Fish Division. The area contains crucial overlapping big game winter ranges and a north-south migration corridor for mule deer, as well as migration corridors for elk, pronghorn, and moose. Currently, the area is closed during the winter season to motorized vehicles to protect wintering big game. The area supports yearlong and seasonal habitats for greater sage-grouse, other sensitive sagebrush obligate species, and all local big game species. In addition, the northeast portion of the proposed MA contains designated elk parturition habitats. The area also contains a raptor migration corridor and potentially provides habitats for Bonneville cutthroat trout, bluehead suckers, and leatherside chub. Roundtail chub and flannelmouth suckers also may utilize the Willow Creek drainage.

The entire proposed MA exhibits low oil and gas development potential. Most of the proposed MA exhibits low occurrence potential for coal; however, approximately 5,000 acres exhibit moderate occurrence potential. Phosphate occurrence potential within the proposed MA is mostly moderate with less than 10,000 acres classified as low and less than 1,000 acres classified as high occurrence potential. The entire proposed MA has low occurrence potential for trona.

Bear River Divide MA

Within the planning area, the Bear River Divide area currently is not identified for other management; however, alternatives to current management identify up to 146,322 acres of the Bear River Divide area as an MA. The proposed area is located southwest of Kemmerer (maps 62 and 64) and directly south of the proposed Rock Creek/Tunp MA. The two areas are connected by underpasses that allow movement of big game from one side of U.S. Highway 30 to the other. The Bear River Divide MA is intended to protect and enhance critical wildlife habitats, cultural values, and paleontology resources. The area includes traces of the Oregon-California NHT, Bear River Divide Trail Landmark, Fossil Butte National Monument viewshed, and internationally renowned fossil fish paleontological resources.

This area is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 1 for both the Green River Regional Wildlife Division and the Pinedale Regional Fish Division (WGFD 2004b). The WGFD reports that the area "…contains crucial big game winter range for the Wyoming Range mule deer, Uinta mule deer, West Green River elk, Carter Lease antelope, and Bear River Divide moose herd units" (WGFD 2004b). The area also contains a north-south migration corridor for mule deer, as well as migration corridors for elk and pronghorn. Currently, the area is closed during the winter season to motorized vehicles to protect wintering big game. The area supports yearlong and seasonal habitats for greater sage-grouse, other sensitive sagebrush obligate species, and all local big game species. The area also contains a raptor migration corridor. In addition, the area potentially provides habitats for Bonneville cutthroat trout, bluehead suckers, and leatherside chub. Roundtail chub and flannelmouth suckers also may utilize area drainages.

The eastern portion of the proposed Bear River Divide MA is located over the Fossil Basin paleontological feature, and the northeast portion is part of the viewshed area of Fossil Butte National Monument. This area is proposed to protect and highlight the paleontological deposits in the area, as well as scenery and views from Fossil Butte National Monument.

A number of gas plants, including Carter Creek, Road Hollow, and Whitney Canyon, occur in the area, including associated surface pipelines. The proposed MA exhibits low to high oil and gas development potential. Coal and phosphate occurrence potentials within the proposed MA primarily have low to moderate oil and gas development potential. Trona occurrence potential within the proposed MA is low.

3.7.2 Wild and Scenic Rivers

Currently no WSRs are designated within the planning area. The Wild and Scenic Rivers Act of 1968 (16 USC § 1271 et seq.) provides for protection of certain selected rivers and their immediate environments that possess outstandingly remarkable values (Interagency Wild and Scenic Rivers Coordination Council 2002). Rivers can be designated into the national system by an act of Congress or by the Secretary of the Interior at the request of a state governor. A designated river is classified as wild, scenic, or recreational based on the presence of development and activity within a river's corridor. Classifications serve as a baseline land use description and guide management activities within the river corridors. Comprehensive management plans for WSRs are developed within 3 years of designation.

Step I – Eligibility Criteria

All of the perennial, ephemeral, and intermittent waterways that exist on BLM-administered surface in the planning area were reviewed. Upon review, resource specialists assessed each waterway under the

eligibility criteria of free-flowing and possessing one or more outstandingly remarkable values. Of the 201 waterways reviewed in the planning area, 188 were found to have no outstandingly remarkable values and were dropped from further consideration, while 13 were determined to meet the WSR eligibility criteria. Four of these 13 eligible waterway segments actually include the main waterway segment and at least one tributary that together were reviewed as "waterway units." They are the Bridger Creek, Pine Creek, Raymond Creek and Smiths Fork River "units." The other nine waterways involving public lands determined to meet the eligibility criteria are Bear River, Blacks Fork River, Coal Creek, Dempsey Creek, Emigrant Creek, Fontenelle Creek, Hams Fork, Huff Creek, and Slate Creek (South Fork).

Table 3-33 details the waterway segments moving forward for additional study.

Step II – Suitability Factors

All of the 13 waterway segments within the planning area found to meet the eligibility criteria are tentatively classified as wild, scenic, or recreational. These segments were further reviewed to determine if they meet WSR suitability factors. Public lands along one waterway (Huff Creek) and one waterway unit (Raymond Creek unit) were found to meet the suitability factors.

The primary factors that caused the review team to arrive at a nonsuitable determination follow:

Factor 1 – Characteristics that do not make the public lands involved a worthy addition to the NWSRS.

Factor 2 – Current status of landownership (including mineral ownership) and land and resource uses in the area, including the amount of private land involved, and any associated or incompatible land uses.

Factor 3 – Reasonable foreseeable potential uses of the public lands involved and related waters which would be enhanced, foreclosed, or curtailed if the area were included in the NWSRS, and the values which may be foreclosed or diminished if the public lands are not protected as part of the NWSRS.

Factor 6 – Ability of the BLM to manage and (or) protect the public lands involved as part of the National Wild and Scenic Rivers System, or by other mechanism (existing and potential) to protect identified values other than by WSR designation.

Eligible waterways identified for further study through BLM planning processes are protected under the BLM's discretionary authority. Existing uses occurring at the time of the evaluation may continue in the same manner and degree on rivers determined eligible for further study. New uses or changes in use will be assessed on a case-by-case basis in an environmental analysis to determine whether the identified waterway values, the free flow, or the tentative classification could be degraded with new or changed use.

In the planning area, the 13 eligible waterway segments are managed to protect the free-flowing, outstandingly remarkable values and tentative classification as WSRs. Brief descriptions of these segments are in Table 3-33. Additional details are available in the Kemmerer Field Office Review of Potential Wild and Scenic Rivers in the Kemmerer Resource Management Plan Planning Area (Jonas Consulting 2002) and can be accessed on the Kemmerer RMP revision website (www.blm.gov/rmp/kemmerer).

Table 3-33. Kemmerer Planning Area List of Eligible Waterways

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Bear River				
T.18N., R.120W., Sec. 20 Miles: 1.16	Yes	Recreational, Wildlife – Popular fishing, camping, and eagle viewing area. Important winter roost habitat for bald eagles.	Yes	Scenic
Blacks Fork River				
(1) T.13N., R.116W., Sec. 18 (2) T.13N., R.166W., Sec. 6 Miles: 1.77	Yes	Scenic, Recreational, Ecological – Unique landscape with variety of vegetation. Important regional fishing area. Unique mix of plant species.	Yes	(1) Recreational (2) Scenic
Bridger Creek Unit				
Bridger Creek: T.19N., R.120W., Sec. 1, 12 T.20N., R.120W., Sec. 22, 26, 27, 35 Miles: 0.97	Yes	Scenic, Historical – Interpretive site overlooking pristine historical landscape. Main route of Oregon Trail with a number of well-preserved ruts.	Yes	Scenic
North Bridger Creek: T.20N., R.119W., Sec. 17, 18; R.120W., Sec. 17, 18, 22, 23 Miles: 4.69	Yes	Scenic, Historical – Interpretive site overlooking pristine historical landscape. Main route of Oregon Trail with a number of well-preserved ruts.	Yes	Scenic
Coal Creek				
T.28N., R.119W., Sec. 25, 26 T.28N., R.119W., Sec. 26, 27 T.28N., R.119W., Sec. 27 Miles: 2.96	Yes	Recreational and Fisheries – Popular fishing area. Important Bonneville Cutthroat trout fisheries.	Yes	Recreational
Dempsey Creek				
T.24N., R.117W., Sec. 29, 30 T.24N., R.117W., Sec. 29, 32, 33 Miles: 1.24	Yes	Scenic, Historical – Overlooks pristine historical landscape. Contains the best preserved section of the Dempsey/ Hockaday Trail.	Yes	Scenic
Emigrant Creek				
T.23N., R.115W., Sec. 9, 10, 14 T.23N., R.115W., Sec. 13, 14, 23, 24, 25; R.114W., Sec. 30 Miles: 6.15	Yes	Scenic, Historical - Overlooks pristine historic landscape. Location of the Slate Creek cutoff of the Emigrant Trail, includes inscriptions and graves.	Yes	Scenic
Fontenelle Creek				
(1) T.25N., R.115W., Sec. 21 (2) T.25N., R.115W., Sec. 21, 28 (3) T.25N., R.115W., Sec. 34; T.24N., R.115W., Sec. 6 (4) T.24N., R.115W., Sec. 6 (5) Fontenelle Gap T.24N., R.115W., Sec. 2, 3, 4 Miles: 6.08	Yes	Scenic, Recreational – Destination fishing stream. Spectacular Canyon at Fontenelle Gap.	Yes	(1) Scenic (2) Scenic (3) Scenic (4) Wild (5) Wild
Hams Fork				
T.23N., R.117W., Sec. 25, 36 Miles: 0.13	Yes	Recreational – An important fishery that allows year-round fishing opportunities.	Yes	Recreational

Table 3-33. Kemmerer Planning Area List of Eligible Waterways (Continued)

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Huff Creek				
T.27N., R.119W., Sec. 21, 22 T.27N., R.119W., Sec. 15 T.27N., R.119W., Sec. 3, 10 T.28N., R.119W., Sec. 27, 34 Miles: 6.02	Yes	Scenic, Fisheries, Wildlife – Narrow river valley with spectacular views. Important Bonneville cutthroat stream. Canada lynx critical habitat.	Yes	Recreational
Pine Creek Unit				
Pine Creek: T.25N., R.118W., Sec. 26, 34, 35 Miles: 3.68	Yes	Scenic, Recreational, Wildlife – Spectacular canyon with exceptionally clear water, cascades, good plant diversity. Provides hiking, hunting, and camping opportunities. Canada lynx critical habitat.	Yes	Recreational
Unnamed Tributary: T.24N., R.118W., Sec 3, 4 T.25N., R.118W., Sec 35 Miles: 1.32	Yes	Scenic, Recreational – Spectacular canyon with exceptionally clear water, cascades, good plant diversity. Provides hiking, hunting, and camping opportunities. Canada lynx critical habitat.	Yes	Recreational
Raymond Creek Unit				
Raymond Creek: T.26N., R.119W., Sec. 4, 5, 6 T.27N., R.119W., Sec. 28, 33 Miles: 4.10	Yes	Scenic, Recreational, Fisheries, Wildlife – Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Raymond Creek South Fork: T.26N., R.119W., Sec. 4, 9 Miles: 2.33	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Cougar Hollow: T.27N., R.119W., Sec. 34, 35 Miles: 0.97	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Trail Creek: T.27N., R.119W., Sec. 33, 34 Miles: 1.43	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Yellow Pine: T.26N., R.119W., Sec. 3, 4, T.27N., R.119W., Sec. 33 Miles: 1.39	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild

Table 3-33. Kemmerer Planning Area List of Eligible Waterways (Continued)

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Green Canyon: T.26N., R.119W., Sec. 9 Miles: 1.04	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Slate Creek				
T.22N., R.114W., Sec. 7, 8 Miles: 0.79	Yes	Scenic, Cultural – Deep, narrow canyon with colorful geological features. Benchmark site for prehistoric, stratified campsite.	Yes	Wild
Smiths Fork River Unit				
Smiths Fork River: (1) T.28N., R.118W., Sec. 3, 10 (2) T.28N., R.118W., Sec. 15, 22, 27 (3) T.28N., R.118W., Sec. 27 (4) T.27N., R.118W., Sec. 4, (5) T.27N., R.118W., Sec. 4, 9 (6) T.27N., R.118W., Sec. 16, 21 (7) T.27N., R.118W., Sec. 33 Miles: 4.97	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	(1) Scenic (2) Recreational (3) Recreational (4) Recreational (5) Recreational (6) Recreational (7) Recreational
Smiths Fork, West Fork: T.28N., R.118W., Sec. 4, 9, 10 Miles: 1.34	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Smiths Fork, Dry Fork: T.28N., R.118W., Sec. 4, 9, 16 T.28N., R.118W., Sec. 16 T.27N., R.118W., Sec. 21, 28 T.27N., R.118W., Sec. 33 Miles: 4.28	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Hobble Creek: T.28N., R.118W., Sec. 34 T.28N., R.118W., Sec. 33 Miles: 0.56	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Porcupine Creek: T.28N., R.118W., Sec. 27 Miles: 0.69	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Trespass Creek: T.28N., R.118W., Sec. 3, 10 Miles: 0.97	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Wild

Source: Jonas Consulting 2002

N North
R Range
Sec Section
T Township
W West

3.7.3 Wilderness Study Areas

Pursuant to the Wilderness Act of 1964, Section 2(c), "wilderness" is defined as "… an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain… an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

The FLPMA of 1976 directs the BLM to inventory and study its roadless areas for wilderness characteristics. To be designated a WSA, an area has to have the following characteristics:

- Size – roadless areas of at least 5,000 acres of public lands or of a manageable size
- Naturalness – generally appears to have been impacted primarily by the forces of nature
- Opportunities – provides outstanding opportunities for solitude or primitive and unconfined types of recreation.

WSAs also often have special qualities, such as ecological, geological, educational, historical, scientific, and scenic values.

Raymond Mountain WSA

One WSA exists within the planning area. The Raymond Mountain WSA is located in the Sublette Mountain Range (Raymond Mountains). The WSA is approximately 19-miles long, 4-miles wide at its widest point, and includes approximately 32,880 acres. The WSA has diverse vegetation and step topography. A major portion of the area is forested with Douglas-fir, lodgepole pine, and other coniferous trees, as well as aspen. The southern end of the WSA contains stands of big sagebrush and rock outcrops.

Current management of the Raymond Mountain WSA is subject to the provisions of the *Interim Management Policy and Guidelines for Lands Under Wilderness Review: Update* Document H-8550-1, 11/10/87. (BLM 1995a). Management emphasizes preservation of wilderness values until wilderness determination is made by Congress. The Raymond Mountain WSA exhibits very low oil and gas development potential, moderate-to-high phosphate occurrence potential, and most of the WSA is classified as having low occurrence potential for coal and trona.

3.7.4 Back Country Byways

Currently, no Back Country Byways are designated within the planning area. The BLM began a Back County Byway program in 1989 to focus on enhancing recreational opportunities. A Scenic Byway System was created 2 years later under Section 1047 of the Intermodal Surface Transportation Efficiency Act of 1991. This act recognized the BLM Back Country and Scenic Byways as a component of the national scenic byway system (Section 1032, eligible projects). The objectives of the byway program include the following:

- Enhance opportunities for the American public to see and enjoy the unique scenic and historical opportunities on public lands.
- Foster partnerships at local, state, and national levels.
- Contribute to local economies.

- Enhance the visitor's recreation experience and communicate the multiuse management message through effective interpretative programs.
- Manage visitor use along the byway to minimize impacts to the environment and to provide protection for the visitor.
- Contribute to the national scenic byway system in a way that is uniquely suited to national public lands managed by the BLM.

Emigrant Springs Back Country Byway

The proposed Dempsey Ridge and Emigrant Springs Scenic Back Country Byway is an existing road loop through Lincoln County (Map 65). The loop begins in Kemmerer and travels over Dempsey Ridge to Fossil Butte and back to Kemmerer. Approximately 4.5 miles of the proposed route is a primitive, four-wheel-drive trail; the rest of the proposed scenic Back Country Byway is an upgraded (crowned and ditched) gravel road. This proposed Back Country Byway will be managed with the objective of encouraging responsible motorized recreational use, while protecting the scenic, cultural, and critical wildlife habitat values in the area.

This route provides recreational enthusiasts the opportunity to explore western Wyoming's natural beauty and remote landscapes. The majority of visitation in the Dempsey Ridge and Emigrant Springs Scenic Back Country Byway is anticipated to occur during the summer season. Interpretive kiosks, which include a map of the area, may be placed at both ends of the byway. Specific management prescriptions for the area will be in place for the protection of sensitive soils, wildlife habitats, visual resources, and important cultural and historical sites.

3.8 Socioeconomic Resources

This section describes existing conditions for Social Conditions, Economic Conditions, Health and Safety, and Environmental Justice.

3.8.1 Social Conditions

Social Conditions

Social conditions in the Kemmerer Field Office planning area that concern human communities include towns, cities, rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values. BLM management actions can impact social conditions in the planning area and in nearby communities. For this reason, a larger area than the planning area is studied for social conditions. This study area is comprised of the entire counties of Uinta, Lincoln, and Sweetwater. This section provides a summary of demographic information; custom, culture and social trends, and current conditions; and public services. Social conditions often are based on a wide range of community and demographic characteristics and involve broad topics of community interests. Other discussions related to social conditions are provided in the Economic Conditions and Environmental Justice sections of this document.

Population and Demographics

The study area is comprised of Lincoln, Sweetwater, and Uinta counties in Wyoming. In 2005, Sweetwater was the most populous, with 37,975 people, Lincoln County had 15,999 people, and Uinta County had 19,939 people (Wyoming Economic Analysis Division 2006a). All three counties experienced rising populations in the late 1970s and early 1980s during the previous oil and gas boom, and population decreases following the oil and gas bust in the mid-1980s. Since 1990, the population has stayed virtually constant in Uinta County, increased steadily in Lincoln County, and, until 2000, decreased steadily in Sweetwater County (Sweetwater County has seen a small rise in population in recent years) (BEA 2006; Wyoming Economic Analysis Division 2006a). Figure 3-6 provides a visual summary of population trends for the three counties from 1970 to 2005.

Table 3-34 provides a tabular summary for each county along with the incorporated cities and towns in each county within the planning area (as well as the whole counties in the study area). The largest city in the Kemmerer Field Office planning area is Evanston, the county seat of Uinta County; the next largest is Kemmerer, the county seat of Lincoln County. Most of the towns and cities in Sweetwater County, including Green River and Rock Springs, are not in the planning area; the only city in Sweetwater County that is in the planning area is Granger.

A substantial proportion of the population of the study area lives outside incorporated cities and towns. For instance, about 8,750 people in Lincoln County, or about 55 percent of the county's population, lived outside incorporated areas in 2005. Similarly, 24 percent of the people in Uinta County (4,900 people) and 18 percent of those in Sweetwater County (about 6,700 people) lived outside cities and towns in 2005 (Wyoming Economic Analysis Division 2006a). This population pattern contributes to the largely rural and small-town character of the study area.

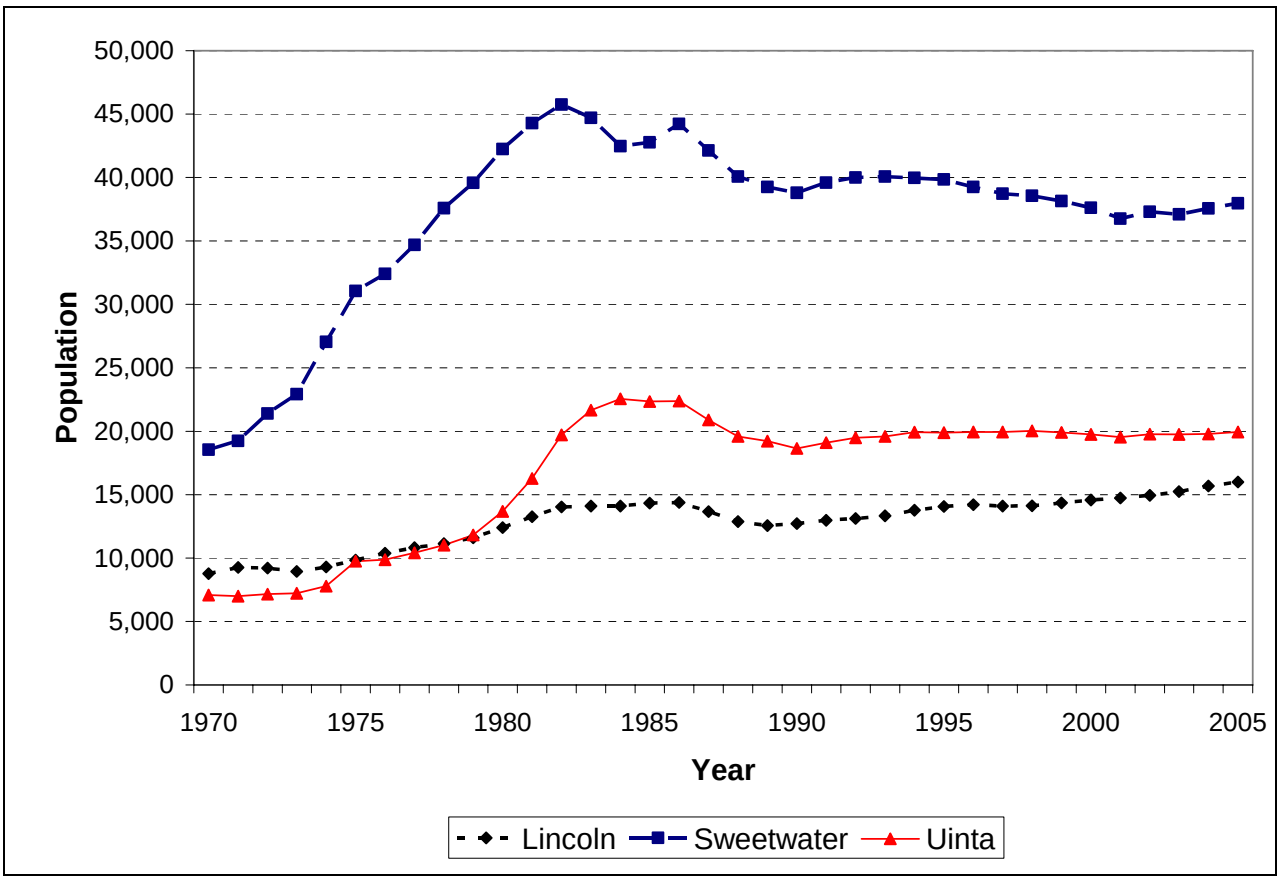
Although total population has increased in all three counties since 2000, changes have occurred with respect to the distribution of different age groups. Since 1990, the proportion of people aged 60 and over, and the proportion aged 40 to 59, have increased; however, the proportion of people in their childbearing years (age 25 to 39) and the proportion of children under age 15 have decreased. One implication of this change is declining enrollments in primary and secondary schools; this trend is addressed later in this section. Table 3-35 provides a summary of the changing demographics in each county. As the table shows, the trend toward

an older population (higher percentage of residents over age 40) is also a statewide trend. In addition, the percentage of people aged 60 and over has increased in all three counties over time.

Housing

Because boom and bust cycles can impact the demand for housing, it is important to know the supply of housing in the study area. Table 3-36 shows the number of housing units over time for the three counties in the study area. From 2000 to 2005 the number of housing units in Uinta and Sweetwater Counties has increased only slightly (by two percent in Sweetwater County and four percent in Uinta County), but has increased by 14 percent in Lincoln County. As the table shows, while population and housing units have increased markedly in Lincoln County since 2000, they have generally kept pace, so that the housing stock has grown commensurate with population.

Figure 3-6. Population Trends in Lincoln, Sweetwater, and Uinta Counties, Wyoming, from 1970 to 2004



Source: BEA 2006 (data for 1970-2004); Wyoming Economic Analysis Division 2006a (data for 2005)

Table 3-34. Population for Counties and Towns in the Study Area Over Time

Area	1990	2000	2005	% Change (1990-2000)	% Change (2000-2005)	% Change (1990-2005)
Lincoln County	12,625	14,573	15,999	+15.4%	+9.8%	+26.7%
Afton	1,630	1,818	1,831	+11.5%	+0.7%	+12.3%
Alpine	200	550	789	+175.0%	+43.5%	+294.5%
Cokeville	493	506	492	+2.6%	-2.8%	-0.2%
Diamondville	864	716	695	-17.1%	-2.9%	-19.6%
Kemmerer	3,020	2,651	2,560	-12.2%	-3.4%	-15.2%
Opal	95	102	99	+7.4%	-2.9%	+4.2%
Thayne	267	341	357	+27.7%	+4.7%	+33.7%
Unincorporated Areas[1]	5,563	7,458	8,755	+34.1%	+17.4%	+57.4%
Sweetwater County	38,823	37,613	37,975	-3.1%	+1.0%	-2.2%
Granger	126	146	146	+15.9%	0.0%	+15.9%
Rock Springs[2]	19,050	18,708	18,772	-1.8%	+0.3%	-1.5%
Green River[2]	12,711	11,808	11,787	-7.1%	-0.2%	-7.3%
Unincorporated Areas[1]	6,195	6,349	6,670	+2.5%	+5.1%	+7.7%
Uinta County	18,705	19,742	19,939	+5.5%	+1.0%	+6.6%
Evanston	10,904	11,507	11,459	+5.5%	-0.4%	+5.1%
Lyman	1,896	1,938	1,937	+2.2%	-0.1%	+2.2%
Mountain View	1,189	1,153	1,163	-3.0%	+0.9%	-2.2%
Unincorporated Areas[1]	4,716	5,144	4,893	+9.1%	-4.9%	+3.8%

Source: Wyoming Economic Analysis Division 2006a (2000 and 2005 data); Wyoming Economic Analysis Division 2006b (1990 data).

[1]May include some people who live in the county but outside the planning area.

[2]These cities are outside the Kemmerer planning area, but within the study area.

Table 3-35. Change in Population Age Groups in Study Area Counties, 1990 to 2000

Percent of Population	Lincoln			Sweetwater			Uinta			Wyoming		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
Percent aged 0-14	32	24	20	29	23	20	34	27	22	25	21	18
Percent aged 15-24	12	14	16	13	16	15	13	16	17	14	15	15
Percent aged 25-39	22	17	16	27	20	18	28	20	17	25	20	18
Percent aged 40-59	20	28	30	21	30	33	18	28	32	21	29	31
Percent aged 60 and over	14	17	18	10	11	13	8	10	12	14	16	17

Source: Wyoming Economic Analysis Division 2006c (data for 2005); Wyoming Economic Analysis Division 2003a (data for 1990 and 2000).

Table 3-36. Housing and Population Over Time in the Study Area

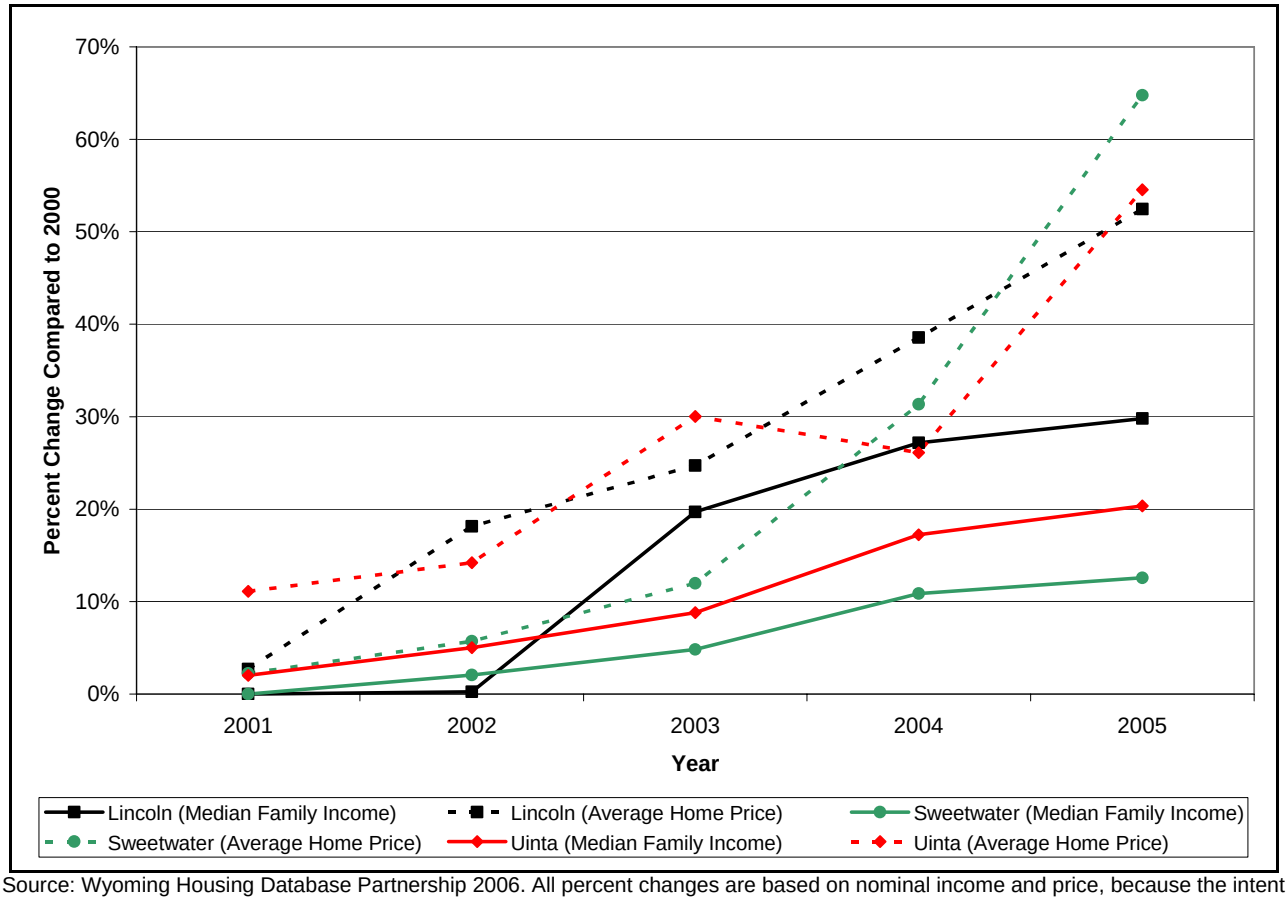
Measure	2005 (Number)	Percent Change Since 2000				
		2001	2002	2003	2004	2005
Lincoln (Population)	15,999	1%	3%	5%	8%	10%
Lincoln (Housing Units)	7,763	3%	6%	8%	11%	14%
Sweetwater (Population)	37,975	-2%	-1%	-1%	0%	1%
Sweetwater (Housing Units)	16,254	0%	1%	1%	1%	2%
Uinta (Population)	19,939	-1%	0%	0%	0%	1%
Uinta (Housing Units)	8,307	1%	2%	3%	3%	4%

Source: Population from Wyoming Economic Analysis Division 2006c; Housing units from Wyoming Economic Analysis Division 2006d.

Some of the growth in housing units, especially in Lincoln County, may be attributable to second homes or vacation homes. As of 2000, 13 percent of homes in Lincoln County were seasonal homes, which makes Lincoln County the third-ranked county in the state in terms of percentage of seasonal homes (after Sublette County, at 26 percent, and Teton County at 20 percent). Three percent of the homes in Uinta County and two percent in Sweetwater County were seasonal homes as of 2000 (Wyoming Economic Analysis Division 2003b).

Housing costs have also increased in recent years. Figure 3-7 shows how median family income and average home sales price have changed since 2000. The dashed lines in the figure represent growth in average home prices compared to 2000, while the solid lines represent growth in median family income compared to 2000. As the figure shows, increases in the average home sales price have outpaced increases in median family income in all three counties and in Wyoming as a whole. For example, from 2000 to 2005 median family income increased by 30 percent in Lincoln County while the average home sales price increased by 52 percent.

Figure 3-7. Change in Median Family Income and Average Home Price Since 2000 in the Study Area



Source: Wyoming Housing Database Partnership 2006. All percent changes are based on nominal income and price, because the intent of the figure is to show how income has changed relative to one element of the cost of living (housing for purchase).

Table 3-37 provides the data used to construct Figure 3-7. The table underscores how in all three counties, growth in average home prices has outpaced growth in median family income. In 2001, median family income in Lincoln County was $41,600; in Sweetwater it was $58,000; in Uinta it was $49,900. In 2005, the respective median family income values were $54,000 for Lincoln, $65,300 for Sweetwater, and $60,050. In 2000, the average home sale price in Lincoln County $123,266; in Sweetwater it was $108,633; and in Uinta it was $89,238. In 2005, the average home sale price in Lincoln County was $187,924; in Sweetwater it was $179,000; and in Uinta it was $137,911.

Table 3-37. Median Family Income and Average Home Sales Price in the Study Area

Measure	Cumulative Percent Change Since 2000				
	2001	2002	2003	2004	2005
Lincoln (Median Family Income)	0%	0%	20%	27%	30%
Lincoln (Average Home Price)	3%	18%	25%	39%	52%
Sweetwater (Median Family Income)	0%	2%	5%	11%	13%
Sweetwater (Average Home Price)	2%	6%	12%	31%	65%
Uinta (Median Family Income)	2%	5%	9%	17%	20%
Uinta (Average Home Price)	11%	14%	30%	26%	55%
Wyoming (Median Family Income)	2%	6%	15%	22%	24%
Wyoming (Average Home Price)	-2%	5%	13%	22%	36%

Source: Wyoming Housing Database Partnership 2006. All percent changes are based on nominal income and price in order to highlight the relative magnitude of changes in median income and housing prices.

Similar to home prices, monthly rents have also increased faster than median family income in some places within the study area. Table 3-38 shows monthly rents in 2006 and changes since 2000, with changes in median family income for the same periods for comparison. Median family income increased from 2000 to 2006, but rents increased as well in all areas, apartment rents increased faster than median family income, and in all areas except northern Lincoln County house rents also increased faster than median family income. Rent for mobile homes generally increased less than median family incomes or increased at the same pace. Rent for mobile home lots grew faster than median family income in Sweetwater and southern Lincoln Counties, but grew slower than median family income in northern Lincoln and Uinta County. The area experiencing the largest rise in rents relative to median income was southern Lincoln County (Kemmerer), followed by Sweetwater County (Rock Springs and Green River).

Table 3-39 shows rental vacancy rates by county. The Wyoming Housing Database Partnership (2006) reported on a survey of rental vacancy rates by county. Summer and winter rental vacancy rates over time have varied; in Lincoln County the summer rental vacancy rate has tended to be lower than the winter vacancy rate in the same year, but in Sweetwater and Uinta Counties the pattern is not as clear. For summer 2006, the survey estimated 1.9 percent of rental units in Lincoln County, 1.9 percent of rental units in Sweetwater County, and 2.5 percent of rental units in Uinta County were vacant. In 2005, the same survey identified rental vacancy rates of 6.7 percent in Lincoln County, 2.4 percent in Sweetwater County, and 3.7 percent in Uinta County (Wyoming Housing Database Partnership 2005). Thus, compared to 2005, rental vacancy rates in 2006 decreased substantially in Lincoln County and increased somewhat in Sweetwater and Uinta Counties. However, because the data are based on a sample, it is not certain whether these rates represent a trend toward lower rental vacancy rates or sampling error. It is important to note that Table 3-39 shows only rental vacancy rates. Comprehensive vacancy data (including properties for sale) from the 2000 Census indicates that vacancy rates in Lincoln, Sweetwater, and Uinta Counties were 23 percent, 11 percent, and 15 percent, respectively (Sonoran Institute 2004a, Sonoran Institute 2004b, Sonoran Institute 2004c).

Table 3-38. Monthly Rent and Median Family Income 2006, and Change from 2000 in the Study Area

Area[5]	Median Family Income		Apartment Rent[1]		House Rent[2]		Mobile Home Rent[3]		Mobile Home Lot Rent[4]	
	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000
Lincoln (Northern)	58,700	+41.1%	431	+75.9%	484	+3.9%	178	+12.7%	406	+30.5%
Lincoln (Southern)	58,700	+41.1%	508	+107.3%	748	+60.5%	165	+4.4%	492	+58.2%
Sweetwater	69,400	+19.7%	684	+86.4%	816	+68.6%	238	+20.8%	669	+71.5%
Uinta	63,800	+27.9%	434	+33.1%	576	+30.0%	197	+31.3%	442	+6.5%
Wyoming	58,800	+31.5%	549	+43.0%	748	+37.2%	210	+24.3%	547	+36.4%

Source: Wyoming Housing Database Partnership 2006 (median family income); Wyoming Economic Analysis Division 2006e (rental costs for 2006); Wyoming Economic Analysis Division 2000 (rental costs for 2000).
[1]Two bedroom, unfurnished unit; excludes gas and electric.
[2]Single wide mobile home lot, including water.
[3]Two or three bedroom single family house; excludes gas and electric.
[4]Total monthly rental expense, including lot rent.
[5]Rents are based on a sample in communities that meet certain population thresholds. Northern Lincoln is based on Afton; southern Lincoln is based on Kemmerer; Sweetwater is based on Green River and Rock Springs; and Uinta is based on Evanston. Data for Wyoming as a whole is based on 28 communities across the state, including the largest community in each county and other communities with over 5,000 people or with a population of at least 85 percent of the county's largest city or town. Prior to 2003, the Wyoming Economic Analysis Division did not report data separately for northern and southern Lincoln County.

Table 3-39. Housing and Population Over Time in the Study Area

Year	Lincoln County		Sweetwater County		Uinta County	
	June/July	December	June/July	December	June/July	December
2001	9.1%	14.4%	8.2%	4.5%	4.0%	11.1%
2002	8.8%	14.6%	6.1%	4.5%	12.6%	3.5%
2003	6.6%	5.5%	2.1%	0.9%	10.4%	9.1%
2004	6.8%	17.0%	0.9%	1.6%	8.1%	6.2%
2005	6.7%	10.2%	2.4%	2.4%	3.9%	1.6%
2006	1.9%	n/a	1.9%	n/a	2.5%	n/a

Source: Wyoming Housing Database Partnership (2006); Wyoming Housing Database Partnership (2005).
n/a = Not available.

Custom, Culture, and Social Trends

Land use, resource development, community values, and economic development are closely intertwined in the study area. Community values with respect to land and resource management are central to social issues in the study area because they are closely tied to issues of economic development, custom and culture, and quality of life. Understanding the social and economic development, culture, and history of the area provides valuable insight into how changes to the study area might impact the livelihood and quality of life of residents. This section addresses broad trends in economic development; Section 3.8.2 provides details on economic conditions and trends.

BLM's land and resource management decisions can impact social and economic conditions for all of the communities in the area. BLM's Kemmerer Field Office administers 32 percent of the total land area of Lincoln County (830,000 acres of the total 2.6 million acres) and 30 percent of Uinta County (approximately 400,000 of the 1.3 million acres). Although the Kemmerer Field Office administers just 3 percent of the land in Sweetwater County—184,000 of nearly 6.7 million acres—the Rock Springs and Rawlins BLM field offices administer additional lands within Sweetwater County. BLM also administers federal mineral estate in all three counties; thus, the BLM's management decisions can impact social conditions in all three counties. However, with respect to social conditions related to ranching, where surface ownership is the

primary consideration, management decisions of the Kemmerer Field Office have more potential to impact conditions in Lincoln and Uinta counties than Sweetwater County.

The economy of the study area is based primarily on resource development (e.g., mining, agriculture) and services. Mining, including oil and gas, provides a large part of the employment and income of the communities in the study area. Mining has been the key economic driver for development of the communities in southwestern Wyoming and continues to provide much of the economic base in terms of jobs, household incomes, and tax revenues that allow governments at the local, state, and national level to attempt to meet the demand for essential services that is being driven by the growth in the oil and gas sector.

Ranching has been and remains an important part of the history, culture, and economy of the study area. Ranchers and livestock permittees/lessees face pressure as they compete with demands of other users of public lands. However, even under this pressure, socially and economically, the agriculture industry is important to local communities. This is shown by the fact that the livestock industry provides direct and indirect employment, maintenance of scenic vistas, active stewardship of remote lands, wildlife habitats, and the continuation of a way of life that helps draw tourists to the state.

The availability of a wide spectrum of recreational opportunities on public lands is another important component of many lifestyles and communities in the study area. For instance, Flaming Gorge Recreational Area and Fossil Butte National Monument, among the more popular outdoor recreation destinations in the state after Yellowstone, the Grand Tetons, and Devil's Tower, bring tourists and local residents into southwestern Wyoming (BLM 2004c). Because recreation involves diverse groups with activities that are compatible for some and incompatible with other, changes in management of public lands can impact the various recreational sectors differently.

In general, resource development and resource protection are both important to sustaining the values within the study area. However, the challenge is seeking an appropriate balance between resource development and resource protection, which is central to the BLM's mission and the RMP process. Therefore, even though some individuals and groups give a high priority to resource protection, while others give a high priority to resource development, it is incumbent on the BLM to find an appropriate balance between these two competing philosophies.

Land and resources have profoundly impacted communities in southwest Wyoming from before European settlement through the present day. The first Europeans came to the study area in the early nineteenth century as trappers, explorers, and settlers. Since the mid-1800s, the mining industry has been a key driver in economic growth and development in the region. Coal, oil, natural gas, and trona are the most important mineral commodities in terms of employment and income, but other minerals (e.g., clay, phosphate, vanadium, and zeolite) have played and continue to play a role in the development of the area.

Cumberland Gap, near Kemmerer, is the site referred to in the first written account of coal production in Wyoming in 1843 (Wyoming Business Council 2004). Coal production began in the mid-1800s, and by 1908, coal mining was the leading industry in Wyoming. The Kemmerer Coal Company, which opened mines near Kemmerer around the turn of the century, is still operating at the present time—the longest continuous operation in the state. Demand for coal declined around 1947 when the railroads began to use diesel locomotives, but increased again in the mid-1960s due to the appeal of Wyoming's low-sulfur coal for electricity production (Wyoming Business Council 2004). Although most of Wyoming's coal now comes from the Powder River basin, the Hams Fork and Green River coal regions continue to be productive; coal production in the three counties in the study area comprised more than 13.7 million tons in 2005 (Wyoming Business Council 2004; Wyoming DOR 2006).

Oil and gas development came later, but served as an impetus for economic development in the study area as well. Production of natural gas has been ongoing since 1903. Although the early production was primarily in the Wind River and Big Horn basins, the Overthrust Belt (located primarily in Uinta County) and the

Green River basin are now among the leading geologic regions for natural gas production statewide (Wyoming Business Council 2004). Natural gas production statewide has increased steadily since the mid-1980s (Wyoming Business Council 2004). Sweetwater, Uinta, and Lincoln counties ranked third, fifth, and seventh, respectively, in quantity of natural gas produced in 2005 (Wyoming DOR 2006). However, the largest share of the production in Sweetwater County is from wells outside of the planning area and production in Uinta County has been declining over the past five years.

Although oil was first produced commercially in Wyoming in 1851, the lack of nearby markets and the high cost of transporting oil by rail resulted in a low demand for Wyoming oil until World War II (Wyoming Business Council 2004). Today, despite declining overall state production since about 1970, activity in the Overthrust Belt has meant that production in the study area continues to account for a sizable portion of state oil and gas production (Wyoming Business Council 2004). In 2005, the three counties in the study area produced nearly 7 million barrels of oil, or about 14 percent of crude and stripper oil in the state (Wyoming DOR 2006). Depending on international oil prices and technological developments (e.g., directional drilling, enhanced recovery methods, extraction from oil shale), oil production in Wyoming may continue to contribute substantially to the region and state economy (Wyoming Business Council 2004).

Sweetwater County is the only county in the state that produces trona (soda ash), which is used in glassmaking and other industries. The Known Sodium Leasing Area, which encompasses about 1,100 square miles in areas where trona is known to exceed 4 feet in thickness, is located in Sweetwater and Uinta counties, with about half of its area (about 550 square miles) in the Kemmerer Field Office planning area (BLM 2003a). In addition to producing 90 percent of the nation's trona, the mines in the Known Sodium Leasing Area also produce much of the trona used around the world. Commercial trona production from the area began in 1950. Today trona mining accounts for an estimated 2,800 jobs in Sweetwater County (Sweetwater Joint Travel & Tourism Board 2005).

The importance of minerals and mining in economic development has meant that the communities in the study area are susceptible to boom and bust cycles based on national and international energy and commodity markets. The most recent boom-bust cycle occurred from the mid-1970s through the mid-1980s, with rising international energy costs in the 1970s due to international events that sparked a boom in Wyoming energy development. For example, the thousands of workers and energy-related businesses that came to Uinta County in the late 1970s tripled the population of Evanston within a few short years (Uinta County 2005). When world energy prices declined in the 1980s, the resulting bust left many communities in Wyoming, including some in the study area, saddled with public debt incurred to provide education and other public services to the new population. However, the mining and energy industry continues to be an economic mainstay and provides many relatively high-paying jobs, as well as critical tax revenues, for state and local services. The Economic Conditions section provides additional information on the contributions of mining and other sectors to current employment, earnings, and tax revenues.

Agriculture, especially ranching, also has been important in the development of communities in the study area. Probably the first intentional ranching occurred in the area in the 1840s (BLM 2004c). Extensive ranch settlement in the region followed the construction of the UPRR around 1867. Early ranchers bought worn-out stock from emigrants, turned the animals out on the range to let them recuperate, and sold the healthier stock back to other emigrants (BLM 2004c). Later, the railroad provided a means for transporting animals to more distant markets. With the exception of Star Valley, agricultural settlement in the study area generally consisted of a mix of livestock husbandry and growing hay and grain in irrigable areas. Cattle ranching dominated the area, but sheep ranching was also an important element of the economy (BLM 2004c). Agriculture in Star Valley differed notably from that elsewhere in the study area, partly due to Mormon settlement in the late 1870s and partly because the valley is topographically and, to an extent, climatically different from the remainder of the study area (BLM 2004c). The Mormons and later settlers raised alfalfa, hay, and barley and husbanded dairy cows. Star Valley became a prominent producer of cheese and butter in the early twentieth century (BLM 2004c), although dairying eventually declined in the

valley, and as of 2006, all the old cheese factories have closed. However, cattle and sheep grazing, hay production, and other agricultural production continues in the study area.

Other industries have influenced social development by providing economic opportunities. For instance, a major maintenance facility for the UPRR was constructed in Evanston in 1871, and for the next 100 years, the UPRR used the Evanston complex for railcar maintenance or related purposes (WYSHPO 2005). Other railroads and similar developments, such as the construction of the Lincoln Highway (later U.S. Highway 30) in the early nineteenth century (BLM 2004c). The land itself also has influenced the social fabric of the communities in the study area, as it has provided hunting and fishing for people from the Native Americans to the early European settlers to today's residents, as well as job opportunities related to recreation of tourists and visitors and scenic vistas and historic places that appeal to tourists and permanent residents. The Economic Conditions section provides additional information about the economic base of the communities in the study area.

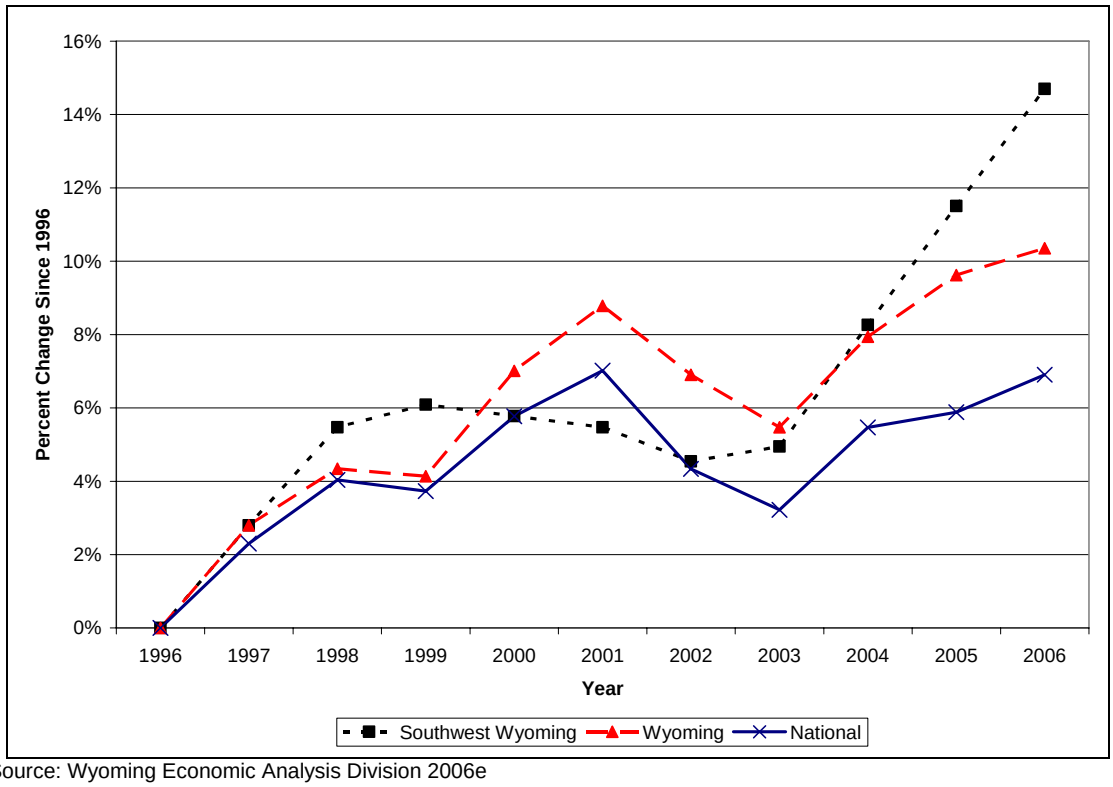
One factor that affects the custom, culture, and social trends within the communities is the cost of living. The Wyoming Economic Analysis Division calculates relative changes in cost of living over time by estimating the cost of a set of goods and services that represents the average consumer's purchases for housing, food, health care, travel costs, and other items. If the cost of living for a particular area increases faster than average income, that may mean that long-time residents, especially those on fixed incomes, may find their lifestyle less affordable over time. Over the long-term, a higher cost of living may encourage people to relocate from a community and discourage migration into a community by households not seeking to relocate in conjunction with employment opportunities. Overall migration into the area will likely decrease, and the demographic and socioeconomic characteristics of those who move in will be determined partially by the cost of living in the area.

Wyoming Economic Analysis Division (2006e) calculates the change in the cost of living over time for a four-county region in southwest Wyoming, consisting of Lincoln, Sweetwater, Uinta, and Sublette counties. Thus, Figure 3-8 shows how the cost of living in southwest Wyoming has changed relative to the cost of living in Wyoming generally and in the U.S. However, it is important to note that the four-county region defined by Wyoming Economic Analysis Division (2006e) differs from the planning area in several ways, including the inclusion of Sublette County as well as all of Sweetwater County. Trends in Sublette County differ from those in the planning area or the study area for two major reasons: first, it is a more popular area for second (vacation) homes; second, the recent energy boom has affected Sublette much more strongly (e.g., resulting in housing shortages and higher housing costs) than the planning area or the study area.

Public Safety

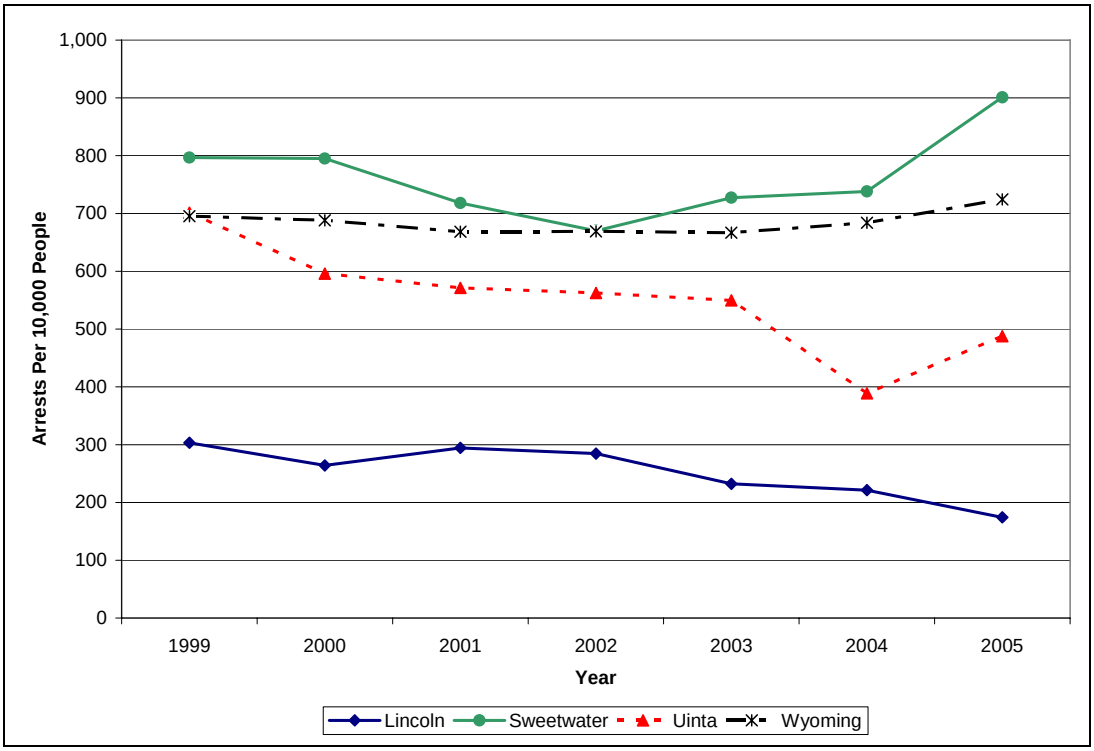
In communities that are experiencing the current energy boom and have experienced other boom and bust cycles in the past, current residents have expressed some concern about social effects, including public safety issues such as crime rates and traffic. This section presents recent trends in crime rates and vehicle traffic in the study area. Figure 3-9 provides a visual summary of arrests per 10,000 people for each of the counties in the study area and for the state. On a per-person basis, arrests have declined steadily in Lincoln County since 1999 and declined in Uinta County from 1999 to 2004, but increased again in 2005. In Sweetwater County, arrests per 10,000 people declined from 1999 to 2002 but have risen since 2002, particularly from 2004 to 2005. Note that the rate of arrests per 10,000 persons is lower for Lincoln or Uinta County than for the state as a whole; arrests per person are, however, higher in Sweetwater County than for the state.

Figure 3-8. Cost of Living Change in the Study Area, 1996-2006



Source: Wyoming Economic Analysis Division 2006e

Figure 3-9. Arrests Per 10,000 Persons in the Study Area, 1999-2005



Source: Wyoming Division of Criminal Investigation 2000, Wyoming Division of Criminal Investigation 2001, Wyoming Division of Criminal Investigation 2002, Wyoming Division of Criminal Investigation 2003, Wyoming Division of Criminal Investigation 2004, Wyoming Division of Criminal Investigation 2005, Wyoming Division of Criminal Investigation 2006.

Table 3-40 shows more detail on arrests, including arrests for crimes of different types. Drug-related crimes, including sale, manufacture and possession, increased significantly since 1999 in all three counties, more than doubling in Sweetwater County, and outpaced population growth substantially. However, the timing of the increase in drug-related crimes differs for the three counties. The largest jump for Sweetwater County occurred from 2004 to 2005, but for Lincoln and Uinta Counties, the increase in drug-related crimes generally occurred between 2001 and 2002 (except for the dip in drug-related crime in Uinta County in 2004, which then picked back up in 2005). All three counties saw decreases in index crimes (i.e., homicide, rape, robbery, aggravated assault, burglary, larceny-theft, and motor vehicle theft) since 1999. Driving under the influence increased since 1999 in Sweetwater County, but has decreased steadily in Lincoln and Uinta counties, except for an increase in Uinta County from 2004 to 2005.

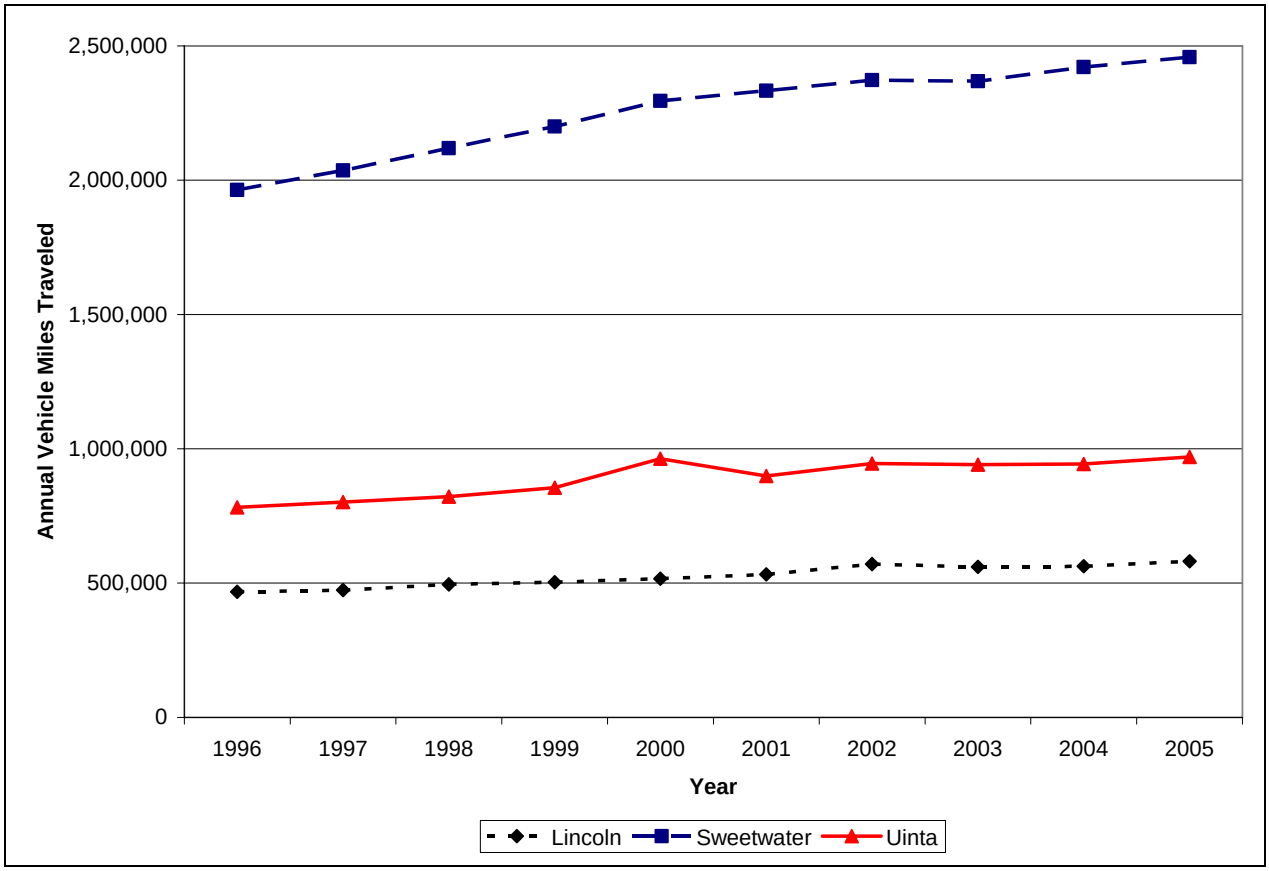
Table 3-40. Arrests by Type in the Study Area and for Wyoming, 1999-2005

Area	Arrests by Year								% Change in Population 1999-2005
	1999	2000	2001	2002	2003	2004	2005	% Change 1999-2005	
Lincoln County									
Total Arrests	435	385	434	425	354	347	279	-35.9%	+11.6%
Index Crimes[1]	46	76	71	54	42	59	42	-8.7%	
Drug Crimes[2]	37	37	43	69	52	55	58	+56.8%	
DUI[3]	153	127	160	175	135	112	98	-35.9%	
All Other Crimes	199	145	160	127	125	121	81	-59.3%	
Area	Arrests by Year								% Change in Population 1999-2005
	1999	2000	2001	2002	2003	2004	2005	% Change 1999-2005	
Sweetwater County									
Total Arrests	3,039	2,990	2,640	2,499	2,698	2,773	3,421	+12.6%	-0.4%
Index Crimes[1]	617	447	290	331	341	387	344	-44.2%	
Drug Crimes[2]	191	181	202	223	295	336	484	+153.4%	
DUI[3]	320	313	369	306	317	364	527	+64.7%	
All Other Crimes	1,911	2,049	1,779	1,639	1,745	1,686	2,066	+8.1%	
Uinta County									
Total Arrests	1,396	1,177	1,116	1,112	1,086	769	973	-30.3%	+0.2%
Index Crimes[1]	169	93	83	95	91	58	78	-53.8%	
Drug Crimes[2]	104	121	105	148	146	77	125	+20.2%	
DUI[3]	264	256	257	218	218	155	205	-22.3%	
All Other Crimes	859	707	671	651	631	479	565	-34.2%	
Wyoming									
Total Arrests	34,204	33,981	33,016	33,396	33,459	34,592	36,898	+7.9%	+3.6%
Index Crimes[1]	3,748	3,496	3,191	3,190	3,077	2,972	3,225	-14.0%	
Drug Crimes[2]	2,321	2,307	2,566	2,675	2,624	2,906	3,234	+39.3%	
DUI[3]	4,258	4,466	4,438	4,232	4,278	4,548	5,011	+17.7%	
All Other Crimes	23,877	23,712	22,821	23,299	23,480	24,166	25,428	+6.5%	

Source: Wyoming Division of Criminal Investigation 2000, Wyoming Division of Criminal Investigation 2001, Wyoming Division of Criminal Investigation 2002, Wyoming Division of Criminal Investigation 2003, Wyoming Division of Criminal Investigation 2004, Wyoming Division of Criminal Investigation 2005, Wyoming Division of Criminal Investigation 2006.
[1]Index crimes include homicide, rape, robbery, aggravated assault, burglary, larceny-theft, and motor vehicle theft.
[2]Drug crimes include sale, possession, and manufacture.
[3]DUI = Driving Under the Influence.

Figure 3-10 provides trend data on vehicular traffic on roads in each of the three counties. The data in the figure refers to vehicle miles per year; vehicle miles represent the product of the number of vehicles and the number of miles. Thus, increasing vehicle miles may be due to a larger number of vehicles, more miles driven per vehicle, or both. As the figure shows, vehicular traffic in all three counties has increased steadily over the last ten years. In all three counties, vehicular traffic has increased more than population since 1996. For example, vehicle miles traveled increased 24 percent in Lincoln and Uinta and 25 percent in Sweetwater between 1996 and 2005. Over the same ten years, population increased 13 percent in Lincoln, stayed virtually constant in Uinta, and decreased by three percent in Sweetwater.

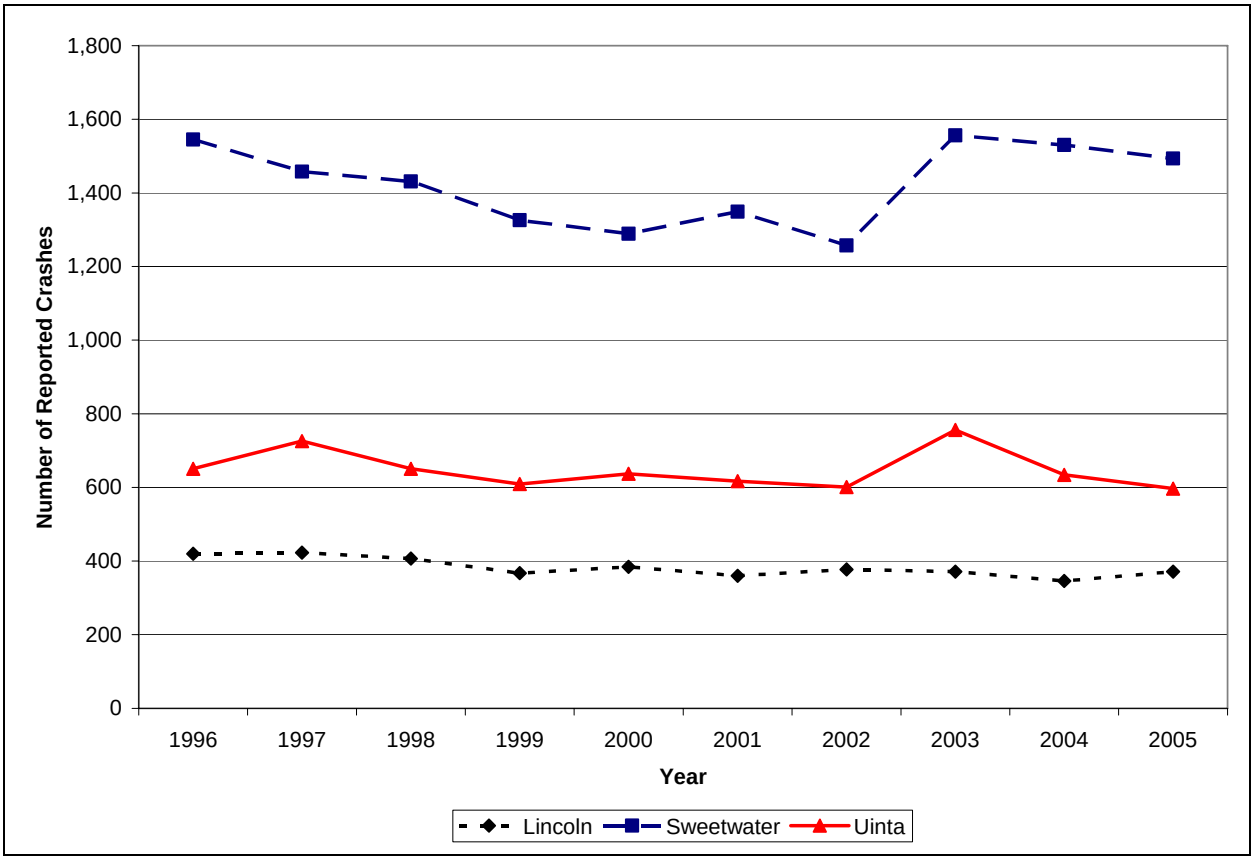
Figure 3-10. Annual Vehicle Miles Traveled Per County in the Study Area, 1996-2005



Source: WYDOT 2006a

Figure 3-11 provides data on the number of reported vehicle crashes since 1996. Despite the increase in vehicle miles traveled shown above, the number of crashes has declined in the last ten years, with a 12 percent drop in Lincoln County, a three percent drop in Sweetwater and an eight percent drop in Uinta County.

Figure 3-11. Reported Vehicle Crashes Per County in the Study Area, 1996-2005



Source: WYDOT 2006b. Reported crashes include those that result in injury, death, or property damage of at least $500 (prior to June 1999) or at least $1,000 (since June 1999).

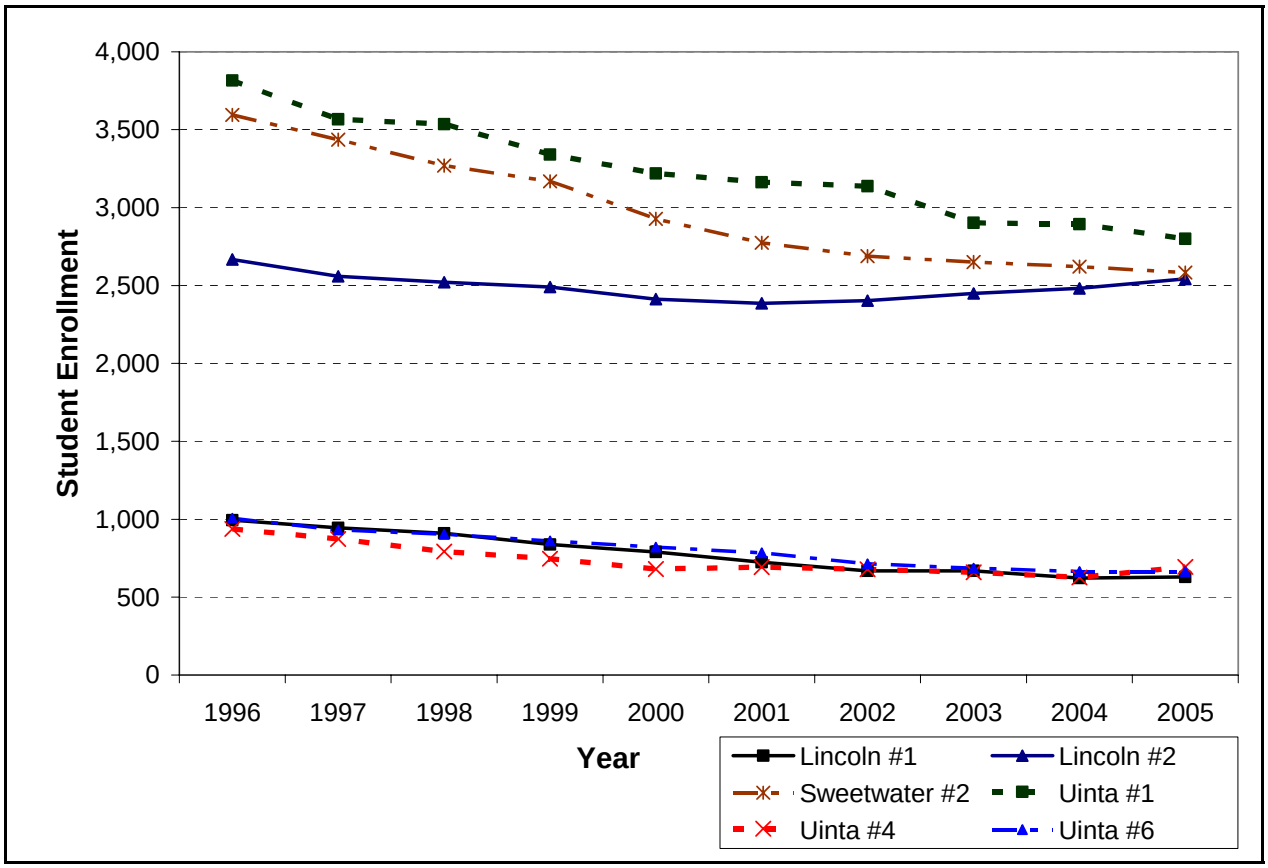
Educational Services

BLM management of public lands, as well as factors outside of the BLM's control, such as energy prices and technological development, could impact the ability of local communities to provide essential services, including education. Recent trends in county and school district budgets provide a useful point of reference for evaluating the potential for BLM management actions to impact the future.

The study area encompasses three school districts in Uinta County (District #1, Evanston; District #4, Mountain View; and District #6, Lyman), two districts in Lincoln County (District #1, Kemmerer/ Diamondville; and District #2, Afton), and one school district in Sweetwater County (District #2, Green River). Figure 3-12 shows historical school enrollment trends in these six districts based on data compiled by the Wyoming Department of Education (Wyoming Department of Education 2006a). Consistent with the population trends shown previously in Figure 3-6, Figure 3-12 shows steady declines in school enrollment from 1996 through 2004 in five of the six school districts in the study area: Kemmerer/Diamondville, Green River, Evanston, Mountain View, and Lyman.

Enrollment in 2005 increased compared to 2004 for Mountain View, but decreased or stayed approximately the same in the other four districts. Only Lincoln County School District #2 (Afton) has seen steady enrollment increases since 2001. The data shown graphically in the Figure 3-12 are shown in tabular form in Table 3-41.

Figure 3-12. School Enrollment Trends by District in Lincoln, Sweetwater, and Uinta Counties, Wyoming, 1996-2005



Source: Wyoming Department of Education 2005
Note: Enrollment figures are those measured on October 1 of each year.
Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

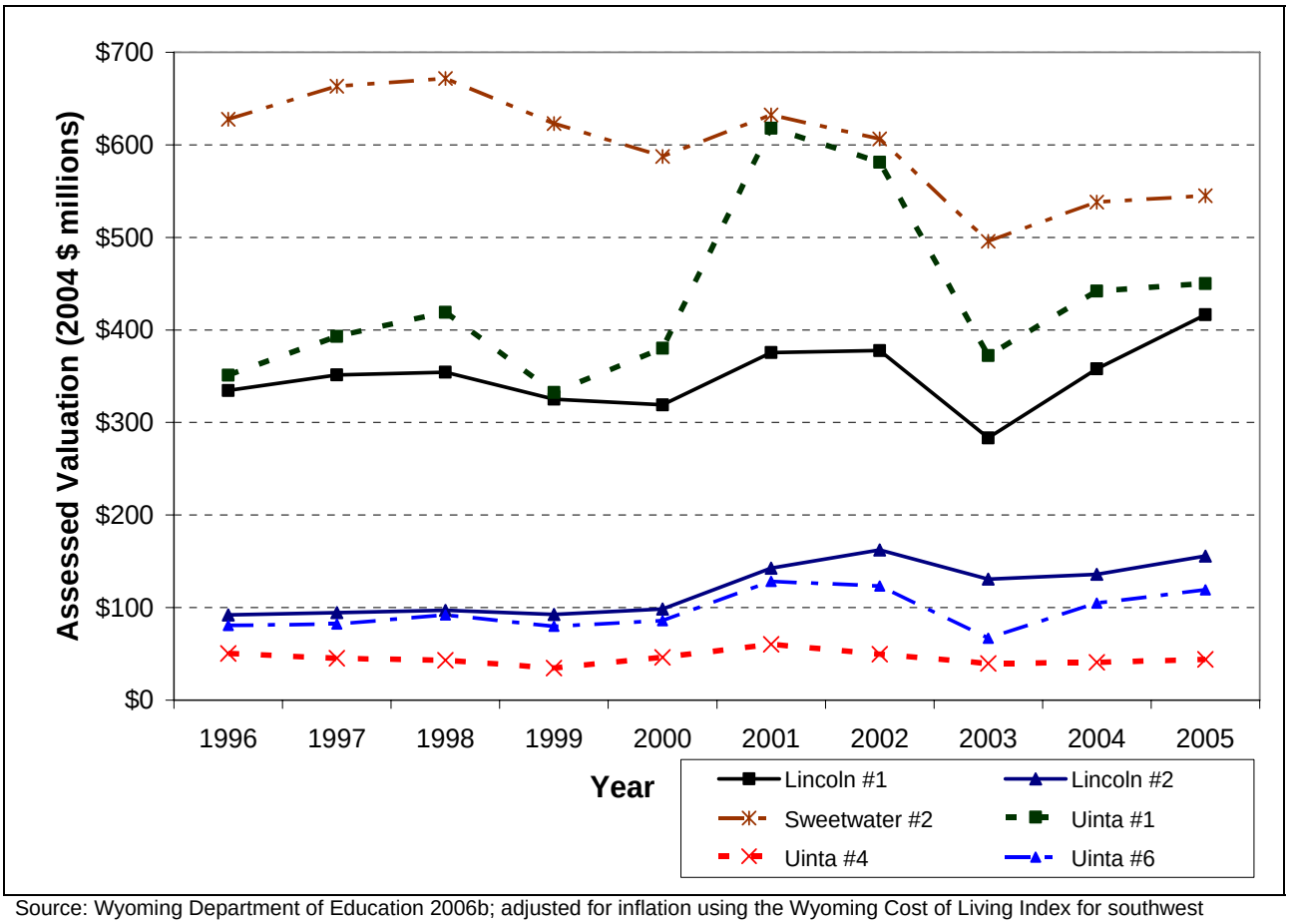
Table 3-41. School Enrollment Trends in the Study Area

District	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Lincoln #1	993	945	909	837	789	724	668	669	622	629
Lincoln #2	2,667	2,559	2,521	2,490	2,412	2,386	2,403	2,449	2,482	2,542
Sweetwater #2	3,595	3,436	3,269	3,168	2,928	2,774	2,688	2,650	2,620	2,582
Uinta #1	3,815	3,567	3,535	3,340	3,219	3,162	3,137	2,902	2,894	2,799
Uinta #4	937	872	793	746	680	692	678	659	626	694
Uinta #6	1,006	930	904	860	820	784	714	686	665	665

Source: Wyoming Department of Education 2006a.
Note: Enrollment is for October 1 of each year.
Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

Since school districts are funded primarily through local and state funding with some federal assistance, local assessed property valuation represents a key driver of the capacity of school districts to generate revenue to fund education. Locally generated revenues may be augmented by funds from the state under a statewide education funding equalization program. Figure 3-13 shows recent trends in assessed property valuation by school district, based on inflation-adjusted 2004 dollars. As the figure shows, assessed property valuation has fluctuated in recent years, but has generally increased since 1996 (except in Green River and Mountain View), and in all districts except Mountain View (where it has remained steady) valuation has increased since 2003 (Wyoming Department of Education 2006b).

Figure 3-13. Assessed Property Valuation Trends by School District in Lincoln, Sweetwater, and Uinta Counties, Wyoming, 1996-2005



Source: Wyoming Department of Education 2006b; adjusted for inflation using the Wyoming Cost of Living Index for southwest Wyoming (Wyoming Economic Analysis Division 2006e).
Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

Because people have different values with respect to changes in demographics and communities, residents of the communities may have different opinions and values with respect to the decline in school enrollments and corresponding demographic changes (e.g., the shrinking proportion of people aged 15 and under). From the perspective of local planners, the demographic change may be problematic if it eventually leads to a decreased ability of the communities to fund social services or pay debts that have been incurred to build infrastructure. However, the recent increase in assessed property valuation for

each school district may help to alleviate this possibility. Part of BLM's mission is to work with local governments to ensure that its management decisions support local goals and plans, community values, and the needs of residents.

3.8.2 Economic Conditions

Economic conditions relate to the analyses of production, distribution, and consumption of goods and services. Economic conditions describe how individuals and communities participate in the exchange of goods and services by earning a living and consuming products and services they need and want. The BLM has the capacity, through its decision making responsibilities, to manage resource development within the Kemmerer Field Office planning area and thereby influence the economy of the wider region. As for social conditions, the study area for economic conditions is comprised of all of Uinta, Lincoln and Sweetwater counties. This section provides a summary of demographic and economic information, including trends and current conditions. It also identifies and describes major economic sectors in the study area that could be impacted by the BLM management actions.

Economic Activity and Output

Industries most affected by BLM land management policies and programs in the study area are mining (including oil and gas), tourism and recreation, and agriculture production. Some harvesting of forest products occurs in the study area, but, at present, the harvest meets local demands only; no known regional or national demand exists for timber products from public lands in the study area (see the Vegetation – Forests, Woodlands, and Forest Products section).

Mining and Mineral Production

Mining and mineral production, including oil and gas exploration and development, constitutes the majority of economic activity in the study area. Table 3-42 provides a summary of the quantity and value of mineral production in the counties in the study area and the State of Wyoming. Economically, the largest contributors to mining activity are oil and gas exploration and development in all three counties, particularly in Sweetwater; coal mining in Lincoln and Sweetwater counties; and trona mining in Sweetwater County. The Mineral Resources section contains additional information about mineral resources that are produced in the study area.

Figures 3-14 through 3-17 show the trends in the value of mineral production over recent years for the study area counties for oil, gas, coal, and trona production. The assessed valuation in the figures is adjusted for inflation using the Wyoming Cost of Living Index for the southwestern region as defined by the Wyoming Economic Analysis Division (2006e) (i.e., Lincoln, Uinta, Sweetwater, and Sublette counties). The trend for the same time period of this index is illustrated in Figure 3-8. As Figure 3-14 shows, oil production value has generally risen since 2002 (Lincoln and Sweetwater) or 2003 (Uinta), but the largest rise has been in Sweetwater County. Gas production value has also risen dramatically in all three counties since 2002; however, gas production value fell in 2002 for all three counties, and has recovered to the 2001 level only recently (2005) in Lincoln and is still lower than the 2001 level in Uinta. Coal production value (adjusted for inflation) has fluctuated over the last ten years; while it has grown in Lincoln County in recent years, the 2005 level is still lower than the levels prior to 2000. Trona production value, adjusted for inflation, declined from 1997 through 2004, but rose in 2005.

Table 3-42. Estimated Mineral Production and Value by County in the Study Area, Production Year 2005

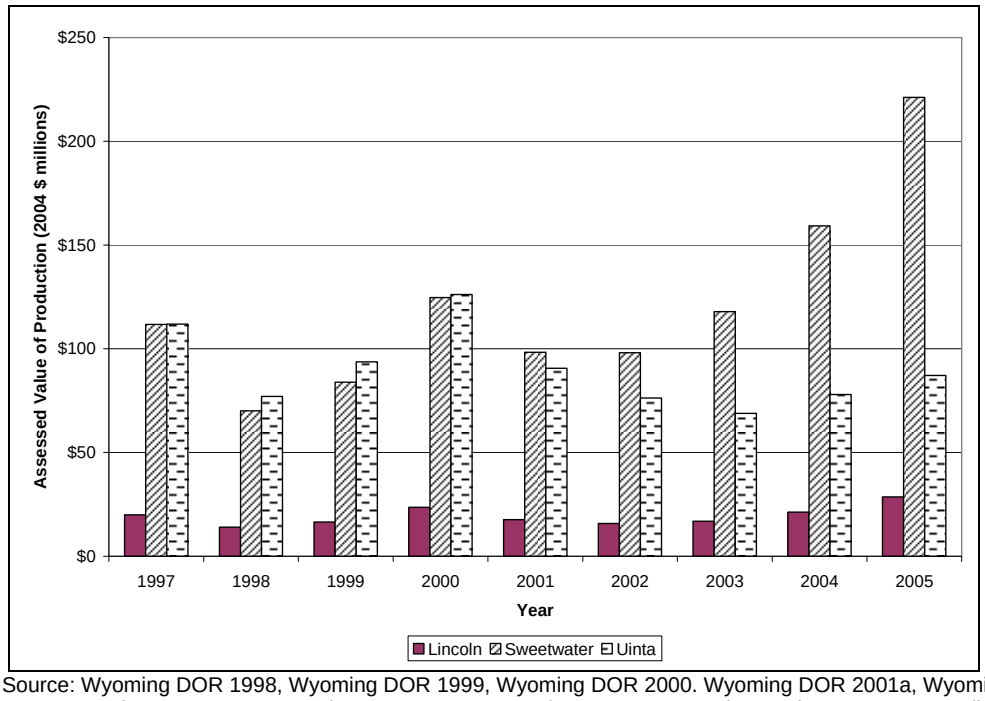
Mineral	Lincoln	Sweetwater	Uinta	Wyoming
Production or Sales (units)				
Oil (bbls sold)	594,986	4,537,736	1,737,789	50,032,004
Gas (mcf sold)	81,332,318	187,801,960	139,699,597	1,943,093,879
Coal (tons produced)	4,616,597	9,412,918	0	404,212,586
Trona (tons produced)	0	19,508,616	0	19,508,616
Sand and Gravel (tons)	484,045	1,212,279	257,018	13,028,452
Clay (tons)	0	0	58,706	58,706
Uranium (lbs)	0	0	0	1,345,257
Decorative Stone (tons)	2,196	0	0	2,262
Taxable Valuation ($ millions)				
Oil	$30	$236	$93	$2,153
Gas	$534	$1,232	$454	$10,134
Coal	$84	$116	$0	$2,280
Trona	$0	$255	$0	$255
Sand and Gravel	$0.7	$1.8	$0.4	$18
Clay	$0	$0	$0.2	$0.2
Uranium	$0	$0	$0	$12
Decorative Stone	$0.1	$0	$0	$0.1

Source: Production and valuation are for July 1, 2005, through June 30, 2006, from Wyoming DOR (2006). Valuation is not adjusted from the values indicated in the report; thus, it is generally in January 2006 dollars (based on the reporting dates).

Notes: Taxable valuation may differ from market or sales value because it excludes certain costs of production. This table includes all minerals for which Wyoming DOR (2006) provides data on production from the counties in the study area.

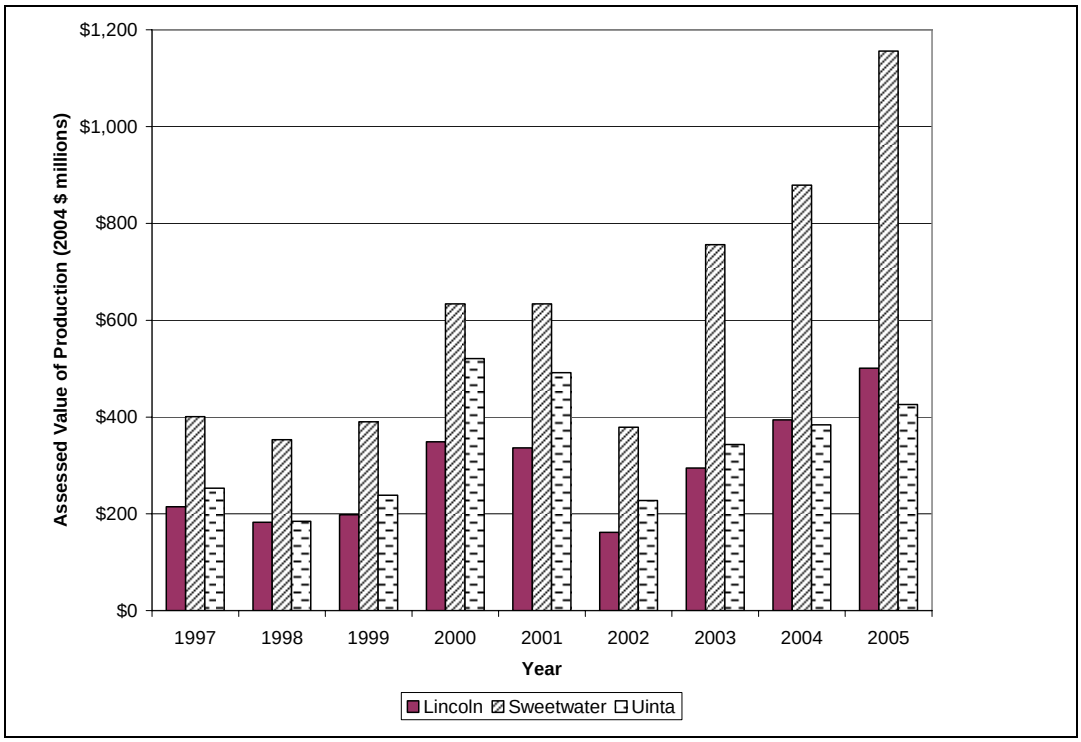
$ dollar DOR Department of Revenue mcf thousand cubic feet
bbls barrels lbs pounds

Figure 3-14. Assessed Valuation of Oil Production by County in the Study Area



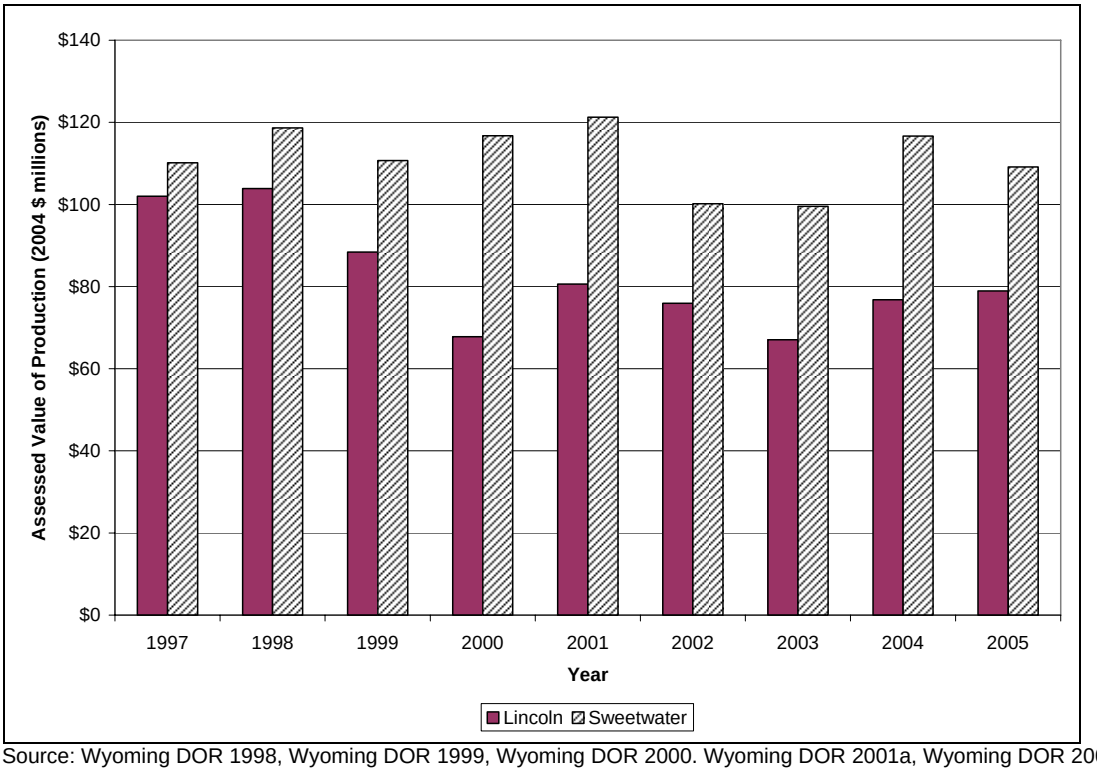
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, and Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-15. Assessed Valuation of Gas Production by County in the Study Area



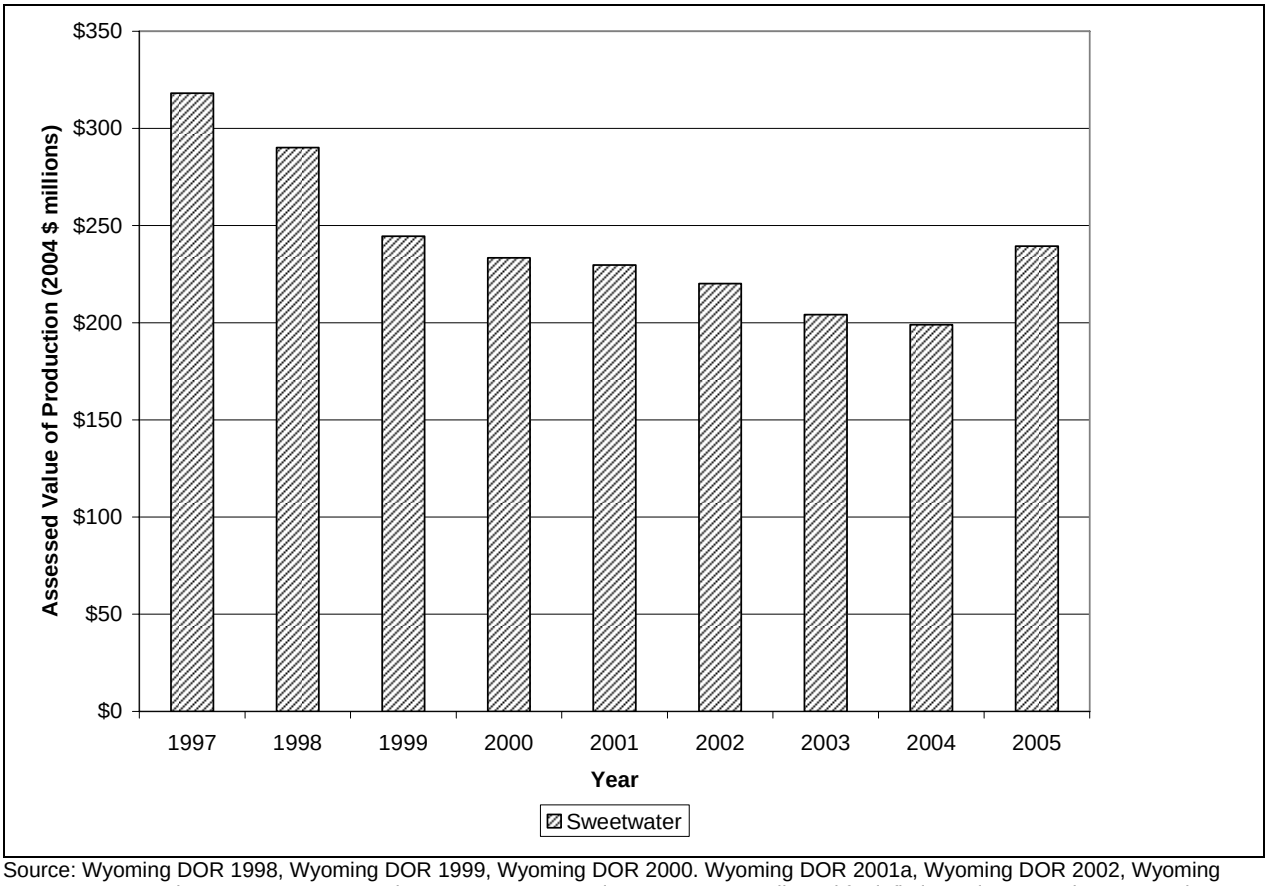
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-16. Assessed Valuation of Coal Production by County in the Study Area



Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-17. Assessed Valuation of Trona Production in the Study Area



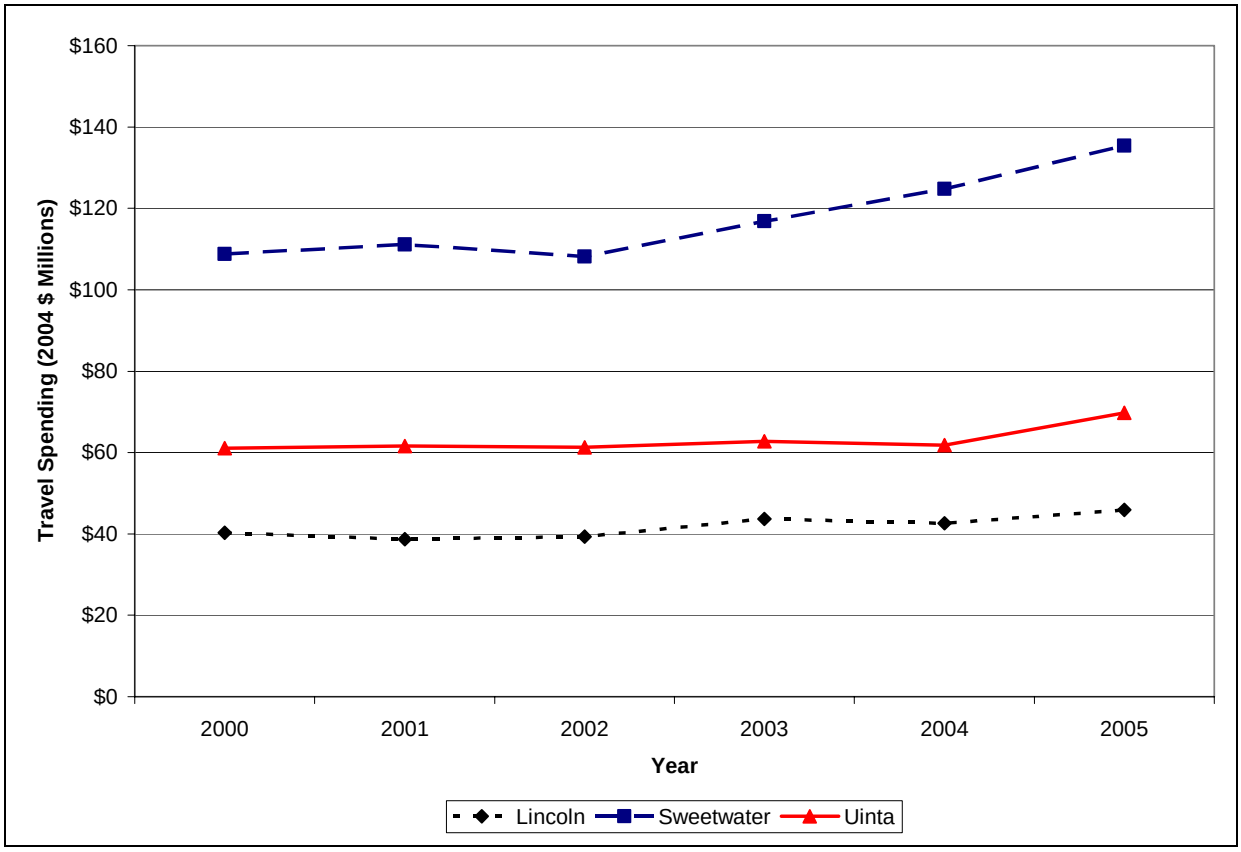
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Recreation

Recreation activities also contribute to the region's economy. In 2003, the WGFD found that direct expenditures from hunting, fishing, and wildlife watching in the counties in the study area totaled $34.3 million (WGFD 2003b). About $14.1 million of these expenditures were attributable to activities on surface area managed by the BLM in the Kemmerer Field Office planning area (WGFD 2003b). Direct expenditures include visitor spending on lodging, food and groceries, gasoline, motor vehicle repairs and service, outfitters and guides, access fees, entertainment, souvenirs, equipment, and other categories.

The WGFD has not undertaken a more recent survey of expenditures from hunting, fishing, and wildlife watching by BLM planning area (Burkett 2006). However, trend data for 2000-2005 (Figure 3-18) shows that travel and tourism spending generally (i.e., including recreation as well as other travel-related spending), adjusted for inflation, has increased recently in all three counties. The figure shows that inflation-adjusted spending has increased recently in Lincoln and Uinta counties after being virtually constant from 2000-2004; spending has increased in Sweetwater County steadily since 2002.

Figure 3-18. Travel and Tourism Spending in the Study Area, 2000-2005



Source: Dean Runyan Associates 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Note that travel and tourism spending includes all travel to the counties, except for commuting and other routine travel; thus, trips for non-recreational purposes are also included. The Wyoming State Office of Travel and Tourism (2006) reported that 90 percent of all trips to Wyoming were for pleasure; this percentage may differ for specific counties, however.

Livestock Grazing

The Kemmerer Field Office manages lands for livestock grazing in all three counties in the study area. The 224 grazing allotments range in size from 7 acres to 470,579 acres. Authorized and actual grazing use is about 157,249 AUMs (BLM 2003a). While the majority of AUMs are used by cattle (about 61.8 percent), sheep and horses also are grazed on BLM lands, accounting for about 37.8 percent and about 0.4 percent of authorized AUMs (BLM 2003a).

Grazing allotments occur throughout the study area (BLM 2003a). BLM-administered lands are important to local ranch operations in all three counties. BLM-administered grazing allotments are leased at lower fees on average than state or private lands: federal grazing fees in Wyoming were $1.35 per AUM in 2003 and $1.43 per AUM in 2004 (BLM 2004k). For comparison, grazing fees on state land were $4.04 per AUM in 2003 and $4.13 per AUM in 2004 (Thorson 2004). The average grazing rate on privately owned nonirrigated land in Wyoming was $13.40 per AUM in 2003 (USDA, NASS-WY 2004).

However, the lower lease fees correspond to potentially greater use restrictions and responsibilities for the lessee. For instance, federal grazing leases typically restrict the number and species of animals that may be grazed, while on private leases, there is normally no penalty for grazing more animals than agreed upon (USFS and BLM 1992). However, if running more animals on a private lease results in

overgrazing, the landowner may not be willing to renew the lease, since if the lessee fails to maintain the condition of the property the agreement may be terminated (USFS and BLM 1992). Federal leases also tend to be less flexible than private leases with respect to adjusting turnout and roundup dates (USFS and BLM 1992). In addition, differences exist in terms of construction and maintenance of rangeland improvements, such as fences and water facilities, although a perfect comparison is not possible because there are different specifications that vary for specific private leases. On federal leases, construction of improvements can be done in a variety of ways, and expenses other than materials may be the responsibility of the lessee; the lessee also is generally responsible for maintaining the improvements. On private leases, the landowner typically bears a substantial part of the cost of major range improvements and typically pays for revegetation (USFS and BLM 1992).

The number of farms and ranches statewide increased slightly from the late 1980s to the early 1990s and has remained at 9,200 from 1992 to 2002. Land for farms and ranches also has been constant from 1992 to 2002, at 34.6 million acres (USDA, NASS-WY 2004). In the counties in the study area, the total number of farms and ranches has increased between 1992 and 2002, but the total land in farms and ranches has decreased. In 2002, there were 1,000 farms and ranches totaling more than 2.7 million acres, compared to 930 farms and ranches on nearly 3.2 million acres in 1992 (USDA 2004; USDA, NASS 1997). Cattle inventories in the counties in the study area declined steadily from 1997 to 2003 and rose slightly in 2004; overall, the number has decreased from 127,000 in 1997 to 96,000 in 2004. An extended multi-year drought across much of the Rocky Mountain west was a contributing factor to the declines. Breeding-sheep inventories have risen and fallen between 1997 and 2004, with an overall decrease from 91,000 in 1997 to 86,000 in 2004 (USDA, NASS-WY 2004). A 1991 study by economists at the University of Wyoming revealed that agriculture is an important source of export income for the state's economy, since many agricultural products produced within the state are sold outside the state. The study also showed that the great majority of inputs to agricultural production come from within the state, and that profits and other income from agricultural production tend to stay within the state. Taken together, these findings indicate that agricultural production is an important contributor to the state's economy (Moline et al. 1991). In a 2000 study, economists at the University of Wyoming compared the income provided to county governments and public schools to the financial demands on community services by agricultural and residential developments. The study shows that on average in Wyoming, ranching activity generates nearly twice as much income for community services as it requires in expenditures on community services, whereas residential development generates about half as much income as it requires in expenditures (Taylor and Coupal 2000). These findings underscore the importance of agricultural production in terms of its contribution to local economies.

Income

Per capita personal income in 2004 was greatest in Sweetwater County; residents of Sweetwater County had an average income of $34,656, including wages, salaries, income from investments and rent, and transfer payments such as social security. Per capita personal income was $27,384 in Lincoln County and $29,677 in Uinta County; the state average was $34,279. From 1996 to 2004, per capita personal income grew in real terms (i.e., accounting for inflation) in all three counties; the gain was largest in Uinta County (27 percent), was 22 percent in Lincoln County, and was 18 percent in Sweetwater County (BEA 2006; Wyoming Economic Analysis Division 2006e).

Table 3-43 provides a summary of the sources of personal income by county in the year 2004. Among the sectors for which data are available, government, mining, and construction are substantial contributors to income in all three counties. Although mining was likely a large contributor in Sweetwater County, Bureau of Economic Analysis (BEA) did not disclose the data for confidentiality reasons; however, Sonoran Institute (2004b) estimates mining contributed 29 percent of income in Sweetwater County in 2000. Manufacturing is also a substantial contributor in Sweetwater County.

Table 3-43. Personal Income by Source of Income in Study Area Counties for the Year 2004 (Percentage of Total)

Source	Personal Income		
	Lincoln	Sweetwater	Uinta
Farm Earnings	0.8	-0.02	0.4
Forestry, Fishing, and Other	0.3	N/A	0.3
Mining	13.1	N/A	11.1
Utilities	N/A	N/A	1.0
Construction	13.1	6.9	8.7
Manufacturing	2.3	8.3	3.3
Wholesale Trade	N/A	N/A	2.0
Retail Trade	3.7	4.9	5.5
Transportation and Warehousing	2.0	5.3	4.7
Information	1.1	0.6	2.2
Finance and Insurance	1.5	1.5	1.0
Real Estate and Rental and Leasing	2.7	2.4	1.9
Professional and Technical Services	1.6	2.3	2.5
Management of Companies and Enterprises	N/A	0.5	N/A
Administrative and Waste Services	N/A	1.5	N/A
Educational Services	0.02	0.1	N/A
Health Care and Social Assistance	N/A	2.9	N/A
Arts, Entertainment, and Recreation	0.8	0.3	0.3
Accommodation and Food Services	1.2	2.5	1.5
Other Services, Except Public Administration	1.4	1.7	1.5
Government and Government Enterprises	14.4	13.2	13.9
Categories for which Data were Not Disclosed	8.4	35.2	7.6
Non-Labor Income[1]	26.3	17.3	15.9
Residence Adjustment [2]	5.3	-7.3	14.6
Total Personal Income ($ millions)	429	1,302	587

Source: BEA 2006.

N/A = Not available (data were not disclosed due to confidentiality reasons; BEA does not report data when there are three or fewer employers in a sector). The line item "Categories for which Data were Not Disclosed" shows the total income attributable to these categories for each county.

[1]Non-labor income includes dividend, interest, and rental income, as well as net transfer payments (retirement, disability, insurance, Medicare, and welfare, less contributions for government social insurance, which are included in earnings for each sector but not included in total personal income). See the text for detail.

[2]Residence adjustment represents the net inflow of the earnings of inter-area commuters (here, expressed as a percentage of total personal income). A positive number indicates that on balance, county residents tend to commute outside the county to find jobs; a negative number indicates that on balance, people from other counties tend to commute in to find jobs. See the text for detail.

The farming, ranching, and agricultural/forestry services sector is most important in Lincoln County, (contributing 1.1 percent of personal income in 2004), but also contributes some income to Sweetwater and Uinta Counties (contributing 0.7 percent of personal income in Uinta County; the data for agricultural and forestry services in Sweetwater County were unavailable due to BEA confidentiality rules) (BEA 2006). The majority (81 percent) of farming and ranching income in Lincoln County is from livestock and livestock products, while about 10 percent is from crops; the remainder is from government payments, rent, and in-kind income such as food grown on the farm (Sonoran Institute 2004a).

The Census County Business Patterns (U.S. Census Bureau 2005) provides additional data on mining related earnings and employment. Table 3-44 shows mining-related earnings and employment for the counties in the study area from this source.

Table 3-44. Earnings and Employment for Mining Activities in Study Area Counties for 2004

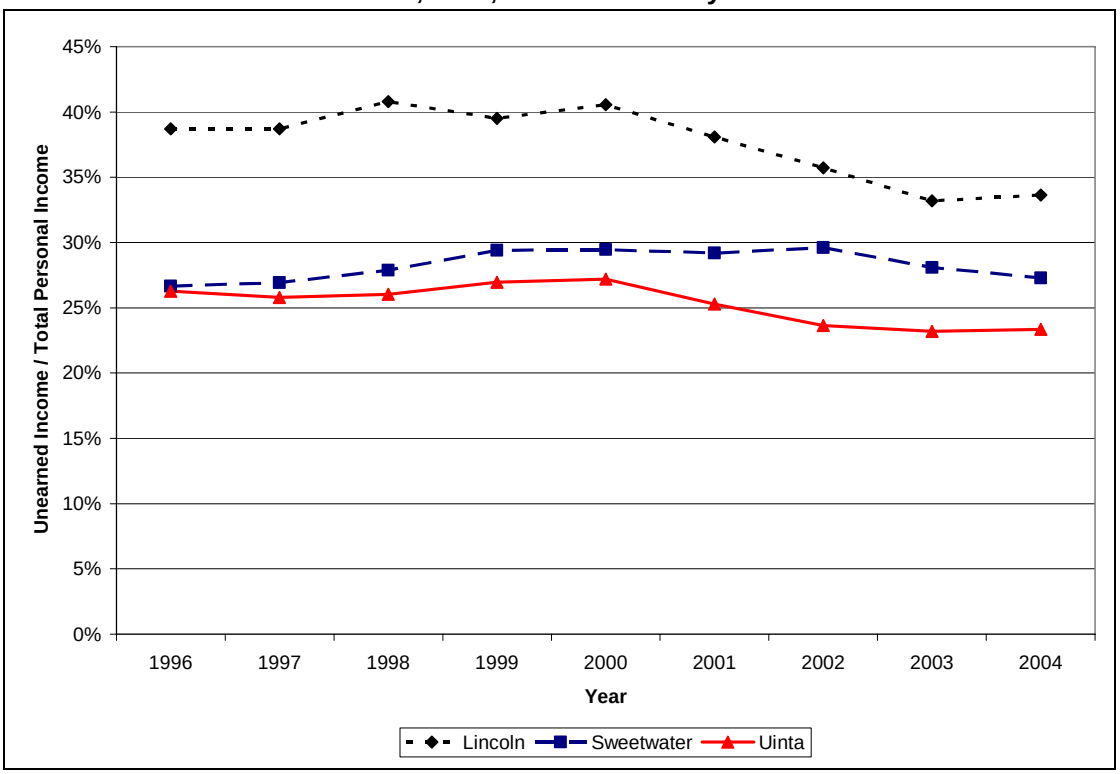
Source	Lincoln		Sweetwater		Uinta	
	Payroll ($)	Employees[1]	Payroll ($)	Employees[1]	Payroll ($)	Employees[1]
Mining	$32,646,000	613	$92,751,000	1,710	$52,721,000	1015
Oil and Gas Extraction	N/A[2]	20-99	N/A[2]	100-249	$20,705,000	264
Mining (Except Oil and Gas)	N/A[2]	250-499	N/A[2]	500-999	0	0
Coal Mining	N/A[2]	250-499	N/A[2]	250-499	0	0
Metal Ore Mining	0	0	0	0	0	0
Nonmetallic Mineral Mining and Quarrying	N/A[2]	20-99	$20,010,000	468	0	0
Mining Support Activities	$12,119,000	245	$25,509,000	516	$32,016,000	751
Drilling Oil and Gas Wells	0	0	N/A[2]	20-99	0	0
Oil and Gas Operations Support Activities	N/A[2]	100-249	$22,749,000	470	$32,016,000	751
Support Activities for Coal Mining	N/A[2]	0-19	0	0	0	0
Support Activities for Metal Mining	0	0	0	0	0	0
Nonmetallic Minerals Support Activity (Except Fuels)	0	0	N/A[2]	0-19	0	0

Source: U.S. Census Bureau 2006. Number of employees is for week ending March 12, 2004. Payroll data are for the entire year.
[1]For some sectors and subsectors, the data source reveals only a range for the number of employees so as not to disclose confidential business information (there are very few employers in the sector).
[2]The data source does not reveal data on payrolls for this subsector due to confidentiality requirements (there are relatively few employers in the sector).
N/A Not Available

Although the U.S. Census Bureau (2006) does not make available all data on employee counts and payrolls due to confidentiality requirements, the data that are provided help to show the economic importance of mineral commodities. Table 3-44 shows that oil and gas extraction and operations support activities contribute substantially to mining-related earnings in all three counties. Oil and gas extraction and operations support contributes at least 120 jobs in Lincoln County (at least 20 percent of mining-related jobs), at least 590 jobs in Sweetwater County (at least 35 percent of mining-related jobs), and all of the 1,015 mining-related jobs in Uinta County (100%). Coal mining contributes at least 250 of the mining-related jobs in Lincoln County (41%) and at least 250 of the 1,809 mining-related jobs in Sweetwater County (15%). In Sweetwater County, nonmetallic mineral (e.g., trona) mining and quarrying contributes 468 direct jobs—that is, about 27 percent of mining jobs in that county. As reported in the Social Conditions section, the total number of jobs in Sweetwater County in trona mining, processing, and related industries is about six times this figure (2,800).

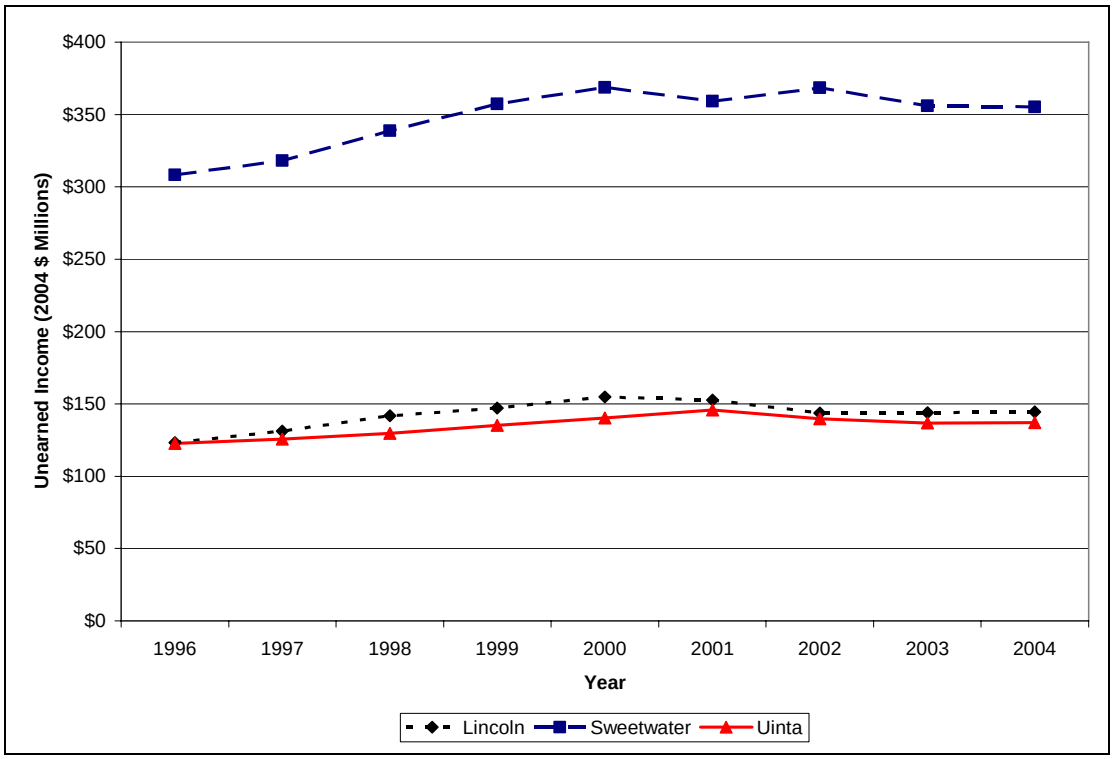
Transfer payments such as Social Security, disability, insurance, Medicare, and welfare, as well as income from dividends, interest, and rent, make up a substantial portion of income in all three counties. Figure 3-19 shows the trend in percentage of income from these sources over time. As the figure indicates, the share of total income from unearned income has decreased over the last ten years in Lincoln and Uinta counties. In Sweetwater County, the percentage of total income from unearned income rose from 1996 to 2002, then declined in 2002 to 2004 and as of 2004, was about the same as the 1996 level. Note, however, that the absolute amount of unearned income has increased (Figure 3-20).

Figure 3-19. Percent of Total Personal Income from Dividends, Interest, Rent, and Transfer Payments



Source: Calculated from data in BEA 2006.

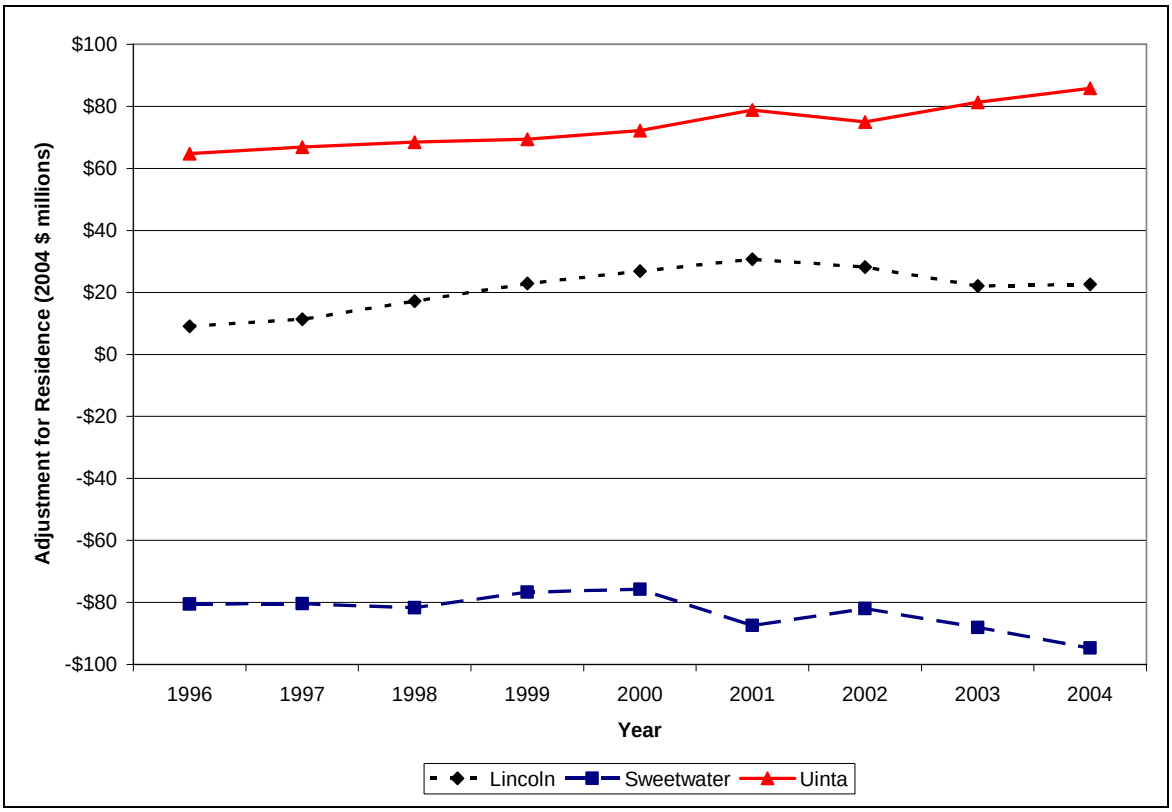
Figure 3-20. Amount of Dividends, Interest, Rent, and Transfer Payments



Source: BEA 2006. Adjusted for inflation using the Wyoming Cost of Living Index for the southwest region (Lincoln, Uinta, Sweetwater, and Sublette Counties) (Wyoming Economic Analysis Division 2006e).

Another indicator of income is the residence adjustment, which measures cross-county flows of income and earnings. While many people live and work in the same county, other people work outside the county in which they live (i.e., they commute across county boundaries). For each county, the net residence adjustment represents the net inflow of earnings due to cross-county income flows, or the difference between the income of those who reside in the county and those who work in the county. Thus, a residence adjustment greater than zero indicates that on balance, the flow of income due to inter-county commuting is positive; that is, people tend to commute outside the county to find jobs. Similarly, a county with a residence adjustment less than zero indicates that people from other counties tend to commute in to find jobs. Figure 3-21 shows the residence adjustment factors for each of the three counties, in real terms (adjusted for inflation). As the figure shows, the residence adjustment in Lincoln and Uinta counties is positive and has increased slightly from 1996 to 2004. The residence adjustment in Sweetwater County is negative, indicating that on balance people who reside outside the county tend to commute into Sweetwater County for work, and has steadily increased in magnitude since 2002.

Figure 3-21. Residence Adjustment Over Time



Source: BEA 2006; adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Employment

The breakout of employment by industry shows a pattern similar to that of the personal income statistics, highlighting the importance of the mining, government, construction, and services in all three counties. Table 3-45 provides a summary of total employment by sector for the counties in the study area. Again, note that the data for some sectors (including the mining sector in Sweetwater County) due to BEA non-disclosure requirements. Note that data on employment for a finer breakout of the mining sector are shown above in Table 3-44.

Table 3-45. Employment by Industry in Study Area Counties for the Year 2004 (Percentage of Total)

Industry	Lincoln	Sweetwater	Uinta
Farm Employment	7.2	0.7	3.3
Forestry, Fishing, and Other	0.9	N/A	0.7
Mining	7.4	N/A	6.0
Utilities	N/A	N/A	0.6
Construction	15.2	7.8	9.1
Manufacturing	3.9	4.5	2.9
Wholesale Trade	N/A	N/A	2.0
Retail Trade	11.0	11.7	13.7
Transportation and Warehousing	2.3	5.0	3.8
Information	1.9	1.0	2.4
Finance and Insurance	2.7	2.2	1.8
Real Estate and Rental and Leasing	4.1	2.9	3.7
Professional and Technical Services	3.2	2.6	4.1
Management of Companies and Enterprises	N/A	0.4	N/A
Administrative and Waste Services	N/A	3.4	N/A
Educational Services	0.4	0.4	N/A
Health Care and Social Assistance	N/A	5.0	N/A
Arts, Entertainment, and Recreation	1.5	1.3	1.5
Accommodation and Food Services	6.3	8.8	6.4
Other Services, Except Public Administration	4.5	4.2	4.5
Government and Government Enterprises	17.6	16.2	18.0
Categories for which Data were Not Disclosed	10.0	21.8	15.6
Total Employment (2004)	9,292	26,033	12,089

Source: BEA 2006.

N/A = Not available (data were not disclosed due to confidentiality reasons; BEA does not report data when there are three or fewer employers in a sector and to preclude identification of information for a specific establishment in cases where there is a dominant establishment). The line item "Categories for which Data were Not Disclosed" shows the total income attributable to these categories for each county.

Average earnings per job in 2004 were lower than the national and state average in Lincoln and Uinta counties, and higher than the national and state average in Sweetwater County. Table 3-46 shows the average earnings per job by county.

Table 3-46. Average Earnings Per Job for Study Area Counties, Wyoming, and U.S. in 2004

Locality	Average Earnings Per Job
Lincoln County	$31,600
Sweetwater County	$45,012
Uinta County	$33,745
Wyoming	$35,584
United States	$44,503

Source: BEA 2005 (Table CA30).

It is important to consider how different average wages can affect the ability of different employers to attract workers. For example, a study in nearby Sublette County (Jacquet 2006) found that wages for jobs in gas development and exploration are higher than in any other sector and are high for both unskilled and skilled workers. Depending on the need for labor in relatively high-paying sectors, this could have adverse effects on the ability of other employers (in relatively low-paying sectors) to attract workers.

Table 3-47 provides recent data (from the first 3 months of 2006) on relative earnings by sector, as well as total employees, for the three counties. As the table shows, the mining sector (including oil and gas development) has the highest average weekly wage of any sector, although in Lincoln County the utilities sector has a comparable weekly wage.

Table 3-47. First-Quarter 2006 Average Monthly Employment and Average Weekly Wage

Sector	Lincoln		Sweetwater		Uinta	
	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage
Agriculture, Forestry, Fishing, and Hunting	20	$543	N/A[1]	N/A[1]	20	$389
Mining	632	$1,469	5,214	$1,367	747	$1,686
Oil and Gas Extraction	203	$1,608	485	$1,787	N/A[1]	N/A[1]
Mining, Except Oil and Gas	295	$1,479	2,130	$1,539	N/A[1]	N/A[1]
Support Activities for Mining	134	$1,235	2,599	$1,148	N/A[1]	N/A[1]
Utilities	201	$1,423	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Construction	725	$694	1,619	$802	994	$934
Manufacturing	259	$464	1,196	$1,328	317	$503
Wholesale Trade	57	$604	619	$931	231	$1,080
Retail Trade	698	$321	2,488	$444	1,201	$333
Transportation and Warehousing	150	$772	1,077	$901	260	$830
Information	153	$594	211	$508	346	$706
Finance and Insurance	124	$519	383	$797	148	$606
Real Estate and Rental and Leasing	39	$133	406	$821	198	$757
Administrative and Waste Services	81	$345	505	$624	180	$385
Health Care and Social Assistance	217	$336	880	$505	1,059	$420
Arts, Entertainment, and Recreation	27	$148	128	$144	57	$224
Accommodation and Food Services	450	$128	2,150	$242	655	$184
Other Services, Except Public Administration	89	$458	599	$640	162	$372
Total Government	1,651	$593	3,973	$643	2,041	$582
All Private Sectors (Non-Government)	4,107	$657	18,475	$875	6,968	$673
All Sectors	5,758	$638	22,448	$834	9,009	$652

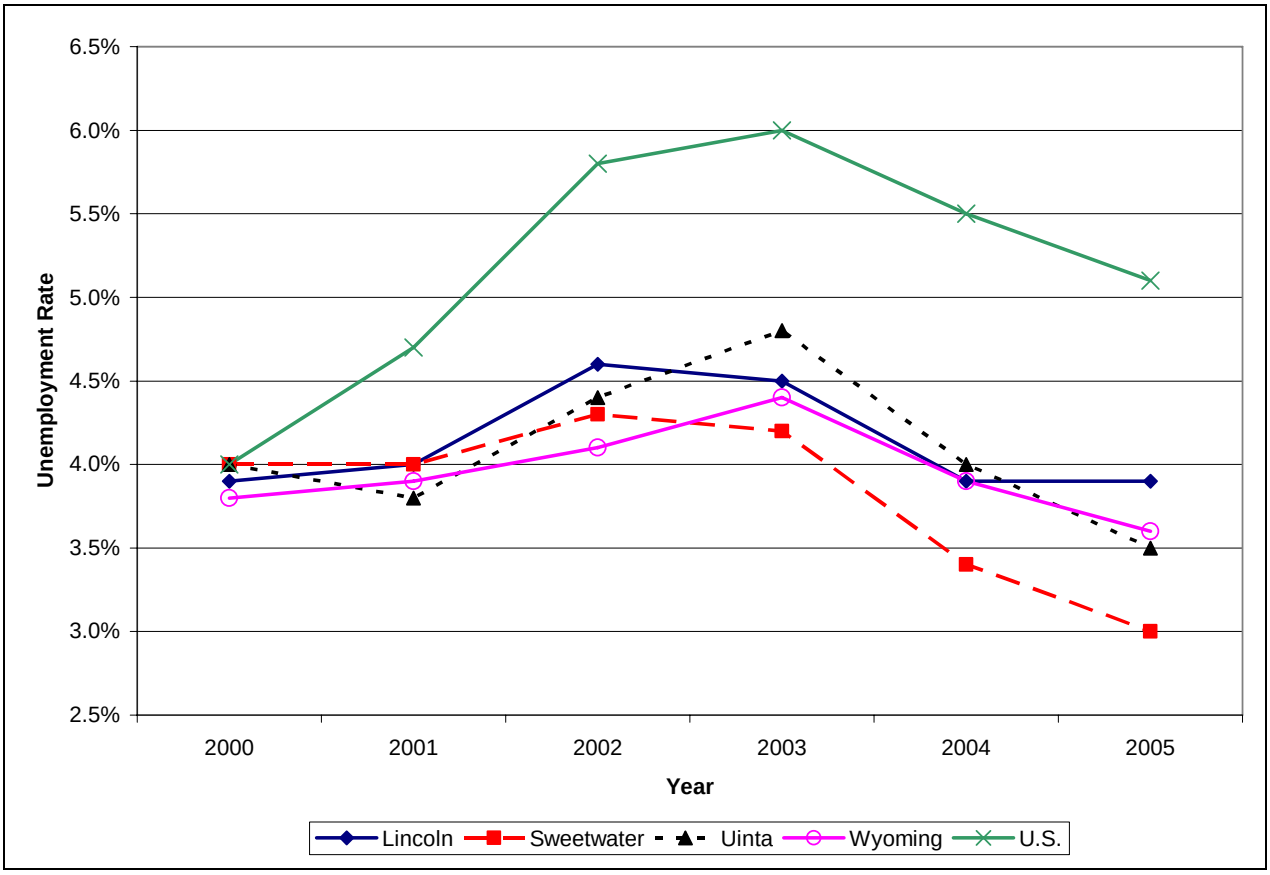
Source: Wyoming Department of Employment 2006.

[1]For some sectors and subsectors, the data source reveals only a range for the number of employees so as not to disclose confidential business information (there are very few employers, or a large dominant establishment, in a sector).

N/A Not Available

All three counties in the study area had lower unemployment in 2005 than the national average of 5.1 percent. Lincoln County had an unemployment rate of 3.9 percent, Sweetwater County had a rate of 3.0 percent, and Uinta County had 3.5 percent unemployment. Wyoming had 3.6 percent unemployment overall in 2005 (BLS 2006a; BLS 2006b). Figure 3-22 shows unemployment rates in recent years for the three counties, Wyoming, and the U.S. As the figure shows, unemployment in the study area has been lower than the national rate since 2001, and has been decreasing since 2003 in all three counties (and since 2002 in Sweetwater and Lincoln counties).

Figure 3-22. Unemployment Rates, 2000 to 2005



Source: BLS 2006a, BLS 2006b

Tax Revenues

Economic activities on BLM-administered land and mineral estate contribute to the fiscal well-being of local governments, as well as to state and federal governments. BLM management actions have the potential to affect tax revenues from mining and mineral production; travel, tourism, and recreation; and livestock grazing and ranching.

Mining, Including Oil and Gas

The mining industry contributes substantially to state and local tax revenues. This may in part explain why Wyoming has no personal or corporate income tax. For example, the Wyoming State Auditor (2006) reported that state mineral severance taxes and federal mineral royalties returned to the state represented 40 percent of total state revenues in Fiscal Year 2005—a total of $1.45 billion. This does not include state sales and use taxes related to mining and mineral production; sales and use taxes represented another 12 percent of total state revenues (Wyoming State Auditor 2006). The Wyoming Legislative Service Office (WLSO 2003) indicated that the mining sector paid about $806 million in state and local tax revenues in Fiscal Year 2002. This represents 54 percent of total state and local tax revenues from major tax sources (severance, *ad valorem*, sales and use, cigarette, gross receipts, liquor, and franchise taxes) for Fiscal Year 2002 (WLSO 2003).

Oil and gas production on federal lands in Wyoming is subject to state, federal, and local taxes, as described below. *Ad valorem* production and production equipment taxes are payable to the county where the production occurs. Since oil and gas are produced from all three study area counties, *ad valorem* production and production equipment taxes are important for all three counties.

State severance taxes are levied on current production at the rate of 6 percent of the taxable value of crude oil and natural gas, and at 7 percent of taxable value for surface coal, 4 percent for trona, and 2 percent for most other minerals produced in the study area (e.g., sand and gravel, decorative stone, and clay). The taxable value is defined as the gross sales value minus certain allowable costs for royalties, transportation, and natural gas processing. Rates are lower for less productive stripper wells (Wyoming DOR 2006). Estimated state severance tax collections for minerals produced in the counties in the study area are shown below.

State and local taxes, including the *ad valorem* property tax, also apply for coal and trona mining. In past years, some coal producers, including some in southwest Wyoming, have paid lower state severance taxes due to a severance tax limitation under the state Coal Equity Act (Wyoming DOR 2004b). Using the data from Table 3-42 along with state severance tax rates, it is possible to estimate state severance tax collections for each county for the different mineral products. Table 3-48 shows estimated state severance tax collections for the counties for Production Year 2005.

Table 3-48. Estimated State Severance Tax Collections on Mineral Production in the Study Area Counties, Production Year 2005

Mineral	Lincoln	Sweetwater	Uinta
Crude Oil	$1,635,100	$14,012,300	$5,561,400
Stripper Oil	$129,400	$86,000	$5,200
Natural Gas	$32,038,500	$73,940,400	$27,230,700
Surface Coal	$5,891,500	$7,948,300	$0
Underground Coal	$0	$105,600	$0
Trona	$0	$10,208,700	$0
Sand and Gravel	$14,800	$35,700	$8,000
Clay	$0	$0	$4,200
Uranium	$0	$0	$0
Decorative Stone	$2,800	$0	$0
Total	$39,712,100	$106,337,000	$32,809,500

Source: Calculated from data in Wyoming DOR 2006.

Note: Estimated using state severance tax rates of 6 percent of taxable valuation for crude oil and natural gas, 4 percent for stripper oil and trona, and uranium, 7 percent for surface coal, 3.75 percent for underground coal, and 2 percent for all other minerals shown. Rounded to the nearest hundred dollars.

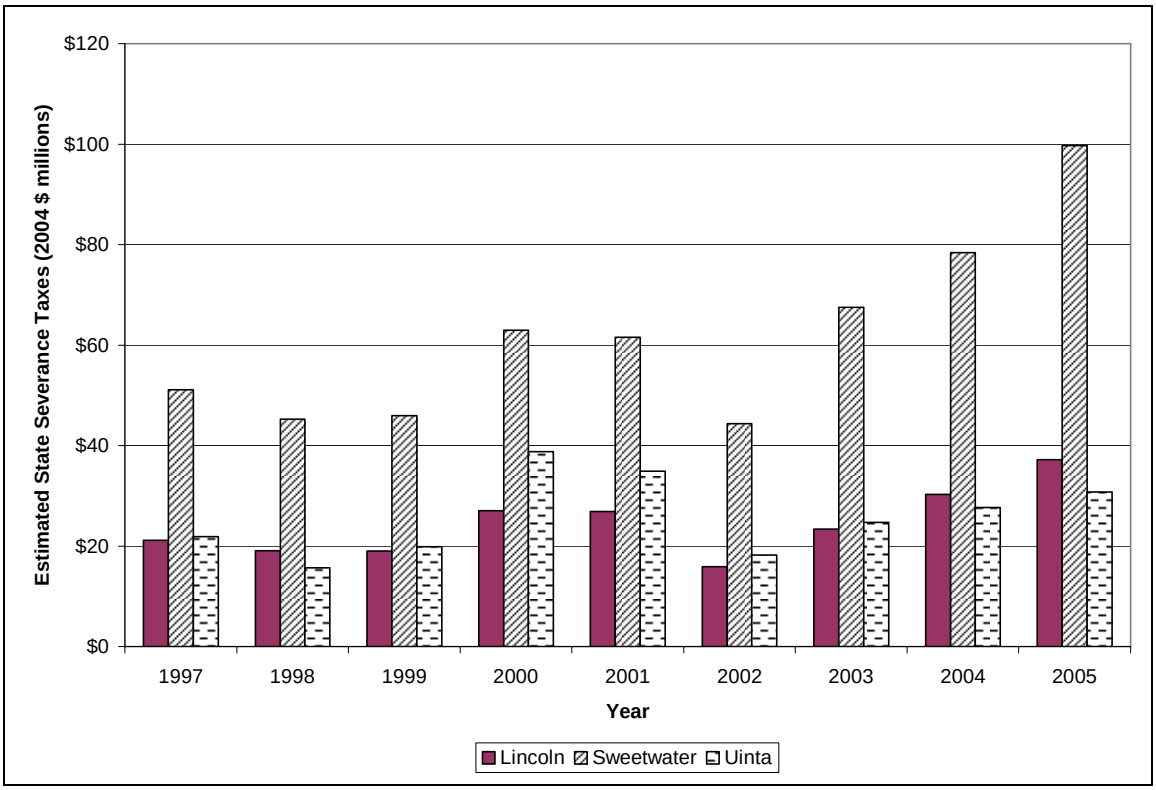
DOR Department of Revenue

As the table shows, state severance taxes based on production within the counties in the study area were greatest in Sweetwater County, which is consistent with the relative importance of mining for employment and earnings in the county. Natural gas was the largest contributor to state severance taxes within all three counties.

The table also shows the gas, oil, coal, and trona accounted for most of the state severance tax collections in the study area counties in 2005. Figure 3-23 shows historical trends in estimated state severance taxes based on production of these commodities within the counties in the study area (i.e., the data on assessed valuation shown in Figures 3-14 through 3-17). As the figure shows, estimated state severance tax revenues, adjusted for inflation using the CPI (BLS 2006a), generally fell in the late 1990s until 2000 and 2001, fell in 2002, and have been rising steadily in all three counties since 2002.

Severance taxes on natural gas, coal, trona and other minerals are then distributed according to a legislatively approved formula. The majority of the revenues are transferred to the state general fund, the state's budget reserve account, and the Permanent Wyoming Mineral Trust Fund. In recent years, less than 4 percent of the total has been distributed to cities, towns, and counties across the entire state.

Figure 3-23. Estimated State Severance Taxes, 1997-2005



Source: Calculated using data in Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Local *ad valorem* production taxes are levied on sales of oil and gas. *Ad valorem* production tax rates vary by county and within counties. In 2006, average tax rates on mineral production were about 6.2 percent in Lincoln County, 6.3 percent in Uinta County, and 6.4 percent in Sweetwater County (Wyoming DOR 2006). Based on these tax rates and the total taxable value of mineral production, it is possible to estimate *ad valorem* production tax assessments in the counties. According to Wyoming DOR (2006), total taxable value of mineral production for Production Year 2005 was $650 million in Lincoln County, $1,841 million in Sweetwater County, and $547 million in Uinta County. Thus, applying the 2006 tax rates to 2005 mineral production, Wyoming DOR (2006) calculated *ad valorem* mineral production tax assessments of $40.3 million in Lincoln County, $118.3 million in Sweetwater County, and $34.3 million in Uinta County. The relative importance of different minerals in the counties in contributing to these tax assessments is illustrated by the data in Table 3-42 shows taxable valuation for the different minerals within the counties.

Local *ad valorem* property taxes are levied on the taxable valuation of oil and gas equipment. Rates are the same as those for *ad valorem* production, but the taxable valuation of oil and gas equipment is 11.5 percent of the assessed value (Grenvik 2005; Wyoming DOR 2001b). County and special district (e.g., school district) property taxes fund schools, libraries, and other public services. Thus, the total assessed valuation provides the revenue base for these essential public services. The Social Conditions section

contains information on current assessed property valuations and recent trends for the study area counties as well as school districts within the counties.

Federal mineral royalties on oil, gas, and coal production are levied at 12.5 percent of the value of production, after allowable deductions. Federal royalties on underground coal production (Bridger Mine in Sweetwater County) are 8 percent. Half the royalties collected, net of a 1 percent administrative processing fee, are returned to Wyoming and a portion of the royalties received by the state are disbursed to cities and towns (State of Wyoming 2004). Federal mineral royalties are also collected on production of other minerals. The rate on trona production has been 6 percent since 1995, but in the fall of 2006 was reduced to 2 percent, which will be the effective rate for at least the next 5 years (Hardy 2006). According to the Wyoming Consensus Revenue Estimating Group, the portion of federal mineral royalties for production in the state that accrued to the state (i.e., 50 percent of total federal mineral royalties for production in Wyoming, net of the administrative processing fee) were $846 million in Fiscal Year 2005 and $1,068 million in Fiscal Year 2006 (CREG 2006). This includes royalties from oil, gas, coal, trona, and other minerals.

The state sales tax applies to retail purchases of goods and some services in Wyoming, while the use tax applies to a retail purchase of goods outside Wyoming by firms in Wyoming. Thus, all purchases by firms doing business in Wyoming, as well as individual residents, are on an equal footing in terms of how they are taxed (Wyoming DOR 2006). In terms of the oil and gas industry, for instance, a firm with operations in Wyoming that purchases equipment from outside the state for use in the state would remit use taxes to the state of Wyoming for the purchase.

Travel, Tourism, and Recreation

BLM management actions also affect travel and tourism, both directly (through decisions that affect recreation access) and indirectly (e.g., through decisions that affect wildlife populations). The State Office of Travel and Tourism estimates that in 2005, travel and tourism accounted for $90.3 million in tax revenues, including $54.8 million (rounded figure) in state revenues and $35.6 million (rounded figure) in local revenues (2005 dollars), not including property tax collections related to recreation infrastructure (Wyoming State Office of Travel and Tourism 2006). Most trips (an estimated 90 percent) are due to tourism for pleasure (Wyoming State Office of Travel and Tourism 2006). Table 3-49 shows tax receipts for the counties in the study area.

Table 3-49. Local and State Tax Receipts Due to Travel and Tourism in Study Area Counties and Wyoming in 2005 ($ millions)

County	Local Tax Receipts	State Tax Receipts
Lincoln	$0.3	$1.6
Sweetwater	$2.4	$4.0
Uinta	$0.9	$2.4
Wyoming	$35.6	$54.8

Source: Wyoming State Office of Travel and Tourism 2006.

Livestock Grazing and Ranching

Livestock grazing and ranching, and agriculture more generally, contribute directly to local and state tax revenues from local *ad valorem* property taxes and local and state sales and use taxes. According to a 2003 report on state and local tax revenues, agriculture along with forestry, fishing, and hunting brought in $9.2 million in state and local tax revenues due to *ad valorem* property taxes, and $1.4 million due to sales and use taxes, for a total of over $10.6 million (WLSO 2003).

3.8.3 Health and Safety

Activities directed toward health and safety concerns in the Kemmerer planning area primarily encompass abandoned mine lands and hazardous wastes and materials.

The BLM is required to address hazards that create safety risks to visitors to BLM-administered lands. BLM's Hazard Management and Resource Restoration Program (HMRRP) is designed to manage hazards on public lands to reduce risks to visitors and employees, restore contaminated lands, and carry out emergency response activities.

Abandoned Mine Lands

The BLM's Abandoned Mine Land (AML) program addresses the environmental and safety hazards associated with AML sites on public lands. Old mine workings are found throughout Wyoming and lands administered by the BLM. The Kemmerer Field Office has been prioritizing and identifying the abandoned mine hazards in an ongoing effort in collaboration with the State of Wyoming DEQ, Abandoned Mine Land Division (DEQ AML). The abandoned mine sites are evaluated in terms of the nature of the hazards they present in relation to people, watersheds, wildlife habitats, and the environment.

The DEQ AML has a well-funded and very active AML reclamation program that includes BLM as a partner. Money has been used from the DEQ AML to correct many known AML safety hazards on BLM lands through the state program. This program is funded by reclamation fees collected under the Surface Mining Control and Reclamation Act (SMCRA) of 1977.

Cooperative Management and Abandoned Mine Land Divisions

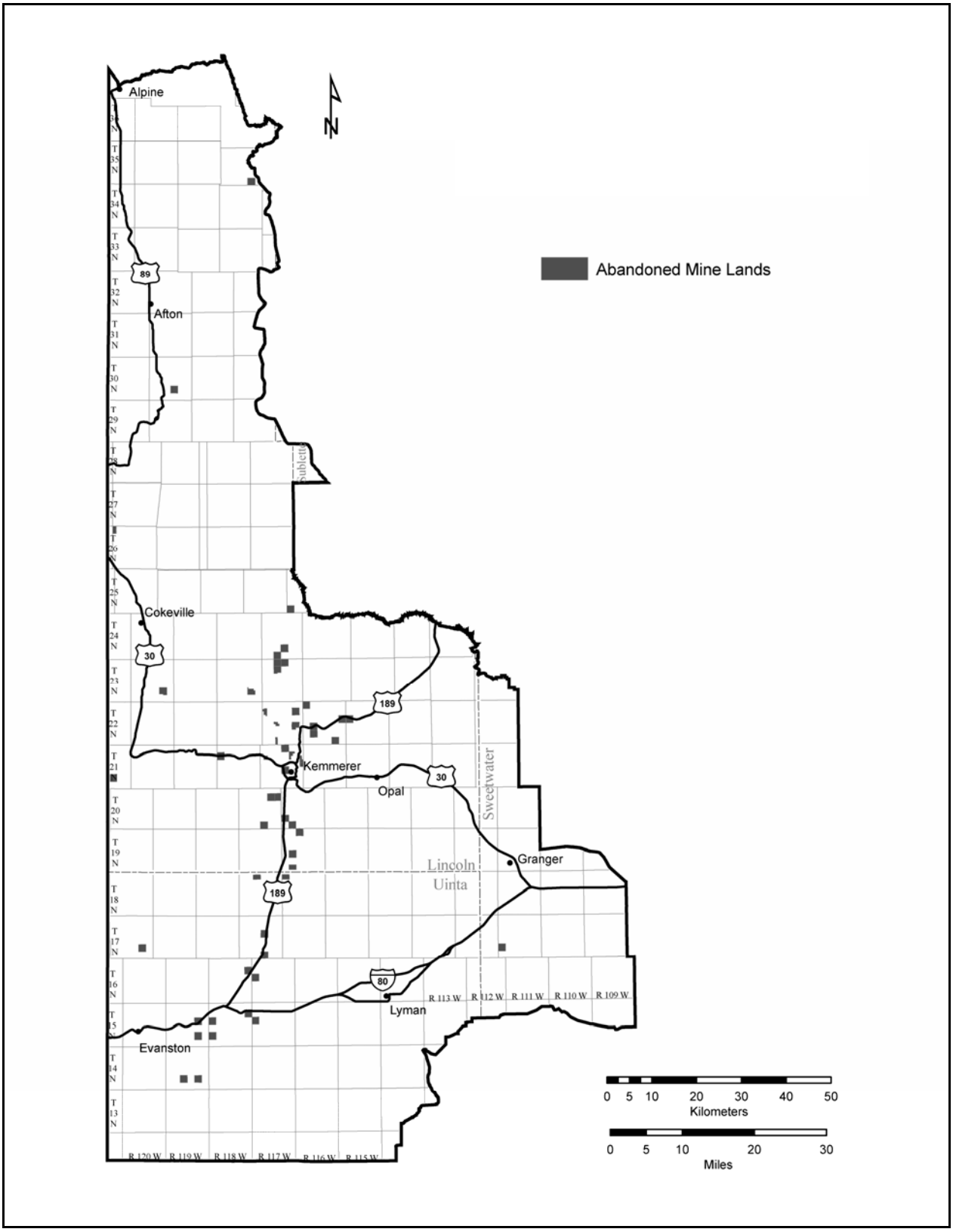
In 1999, the BLM and the DEQ AML signed a cooperative agreement that further facilitated the reclamation of AML sites on BLM-administered lands. The state program, as required by the SMCRA, focuses on public safety hazards. In addition, the BLM has received some funding within its Watershed Management Program to address environmental hazards and watershed concerns associated with abandoned mines on a site-specific basis. By combining available funding, safety hazards and environmental impacts to water quality and watershed function can continue to be addressed in a more comprehensive fashion at priority AML sites. In this collaborative approach, the BLM and the DEQ AML are undertaking several AML reclamation projects on public lands within the planning area.

Extreme physical hazards are common at abandoned mine sites. For the visitor enjoying outdoor recreation, the hazards are not always apparent. Abandoned mine sites have proved to be a tempting and sometimes life-threatening hazard for both children and adults. Serious injury or death may occur at these sites. Common hazards include open vertical shafts; unstable overhead rock and decayed support structures; deadly gases and lack of oxygen; remnant explosives and toxic chemicals; becoming lost and disoriented while underground; and, at abandoned surface mines, high walls, open pits, and open drill holes.

Additional hazards occur in relation to abandoned coalmines. Mine and coal outcrop fires can start due to lightning strikes or other factors. These fires can be very difficult to control. The Kemmerer Field Office coordinates with the AML to eliminate the hazards associated with these fires.

Abandoned mines in the planning area mostly comprise coal and phosphate mining and prospecting areas. Map E shows the locations of many of the abandoned mines. The Kemmerer Field Office has cooperated with the State Abandoned Mine Land Division to reclaim the abandoned phosphate mining sites at Top of the World and Leefe mines.

Map E. Abandoned Mine Lands



Hazardous Materials and Wastes

Public land administrated by the BLM is used for a variety of permitted activities that can lead to the release of hazardous materials and wastes. This may occur through accidental spills, illegal dumping and disposal activities, or through illegal drug manufacturing. Such releases can result in adverse health and environmental impacts within the planning area. Biological hazards are a new source of concern for the BLM. These hazards include, but are limited to, anthrax, bubonic plague, Hantavirus, and foot and mouth disease.

Cooperative Management and Hazardous Materials and Wastes

The Wyoming DEQ is responsible for regulating hazardous wastes within the State of Wyoming. However, as mentioned earlier, the BLM's HMRRP implements management practices on hazardous wastes to reduce risks to visitors and employees, restore contaminated lands, and carry out emergency response activities.

Management actions for health and safety hazards generally address reducing health and safety risks to visitors and employees, educating the public about the risks, and identifying potential hazards. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.8.4 Environmental Justice

Environmental justice pertains to fair treatment and meaningful involvement of minority and low-income populations. Where the impacts of a proposed federal action may involve such populations, an analysis of the potential for disproportionate impacts and meaningful community outreach and public involvement is required.

BLM does not manage environmental justice resources; rather, it manages public lands and the resources and uses that occur on them. Analysis of environmental justice impacts and meaningful involvement of minority and low-income populations in the planning process are required by federal regulations and policies. No specific management issues or concerns have been identified to date, including during the scoping process.

Minority Populations

BLM IM 2002-164, "Guidance to Address Environmental Justice in Land Use Plans and Related NEPA Documents," provides policy and guidance for addressing environmental justice in BLM land use planning (BLM 2002f). IM 2002-164 defines minority persons as "Black/African American, Hispanic, Asian, Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons." Furthermore, IM 2002-164 indicates that an area should be considered to contain a minority population where either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population.

Populations of all three counties in the planning area are predominantly non-Hispanic white. Only Sweetwater County has a smaller proportion of non-Hispanic white residents than the state, about two percentage points lower. Sweetwater also has a higher proportion of Hispanic/Latino residents than Wyoming as a whole. Table 3-50 provides a summary of population by race and ethnicity in 2000.

Table 3-50. Racial and Ethnic Groups for Planning Area Counties, and Wyoming (Percent of Population in 2000)

Race or Ethnicity	Lincoln	Sweetwater	Uinta	Wyoming
Non-Hispanic, White	96.1	86.9	92.2	88.9
Non-Hispanic, Black	0.1	0.7	0.1	0.7
Non-Hispanic, American Indian/Alaska Native	0.5	0.8	0.8	2.1
Non-Hispanic, Asian, Native Hawaiian, or Pacific Islander	0.3	0.7	0.3	0.6
Non-Hispanic, some other race	0.0	0.1	0.1	0.1
Non-Hispanic, two or more races	0.9	1.5	1.1	1.2
Hispanic or Latino (of any race)[1]	2.2	9.4	5.3	6.4

Source: U.S. Census Bureau 2002

Note: Detail may not add up to 100 percent due to rounding.

[1]Hispanic/Latino breakout is separate because Hispanics/Latinos can be of any race.

As Table 3-50 shows, in no county does the percent of minority residents exceed 50 percent. In addition, the percent of minority residents exceeds the proportion for Wyoming only in Sweetwater County, and only by a small margin. This suggests that none of the counties contains a minority population that is "meaningfully greater" than the general population.

Although there are no Native American reservations in the planning area, the Wind River Indian Reservation is about 60 miles east of the eastern boundary of the planning area. There are neither Indian trust lands nor tribal properties known to occur in the planning area. The Tribal Treaty Rights and Trust Responsibilities section describes American Indian treaty rights and BLM trust responsibilities.

Low-Income Populations

With respect to low-income populations, IM 2002-164 indicates that low-income populations can be identified according to poverty thresholds published by the U.S. Census Bureau. In addition, the IM notes that "when considering these definitions, it is important to recognize that some low-income and minority populations may comprise transitory users of the public lands and thus not associated with a particular geographic area."

CEQ guidance for environmental justice analysis under NEPA defines a "low-income population" as "either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect" (CEQ 1997). Although CEQ guidance does not provide a quantitative threshold (e.g., a limit on the percent of persons in poverty) for determining whether a population should be considered a low-income population, typically the percent of persons in poverty in the study area is compared to that in a comparison area such as the state. Quantitative criteria for what constitutes a low-income population are not specified in BLM, CEQ, or EPA guidance.

In 1999, 11.4 percent of the people living in Wyoming had incomes below the poverty level. This compares to 9 percent in Lincoln County, 7.8 percent in Sweetwater County, and 9.9 percent in Uinta County (U.S. Census Bureau 2002). The fact that none of the counties has a percentage of people in poverty that exceeds the state average suggests that there are no substantial concentrations of people living in poverty in the planning area.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Roadmap to Chapter 4

Chapter 4 discussions are grouped by general resource topics, as outlined below.

4.1 Physical Resources (Page 4-6)

- Air Quality
- Soil
- Water

4.2 Mineral Resources (Page 4-25)

- Locatable
- Leasable
  - Oil and Gas
  - Coal
  - Sodium (Trona)
  - Other Solid Leasables
- Salable

4.3 Fire and Fuels Management (Page 4-43)

- Unplanned/Wildland Fire
- Planned/Prescribed Fire
- Stabilization and Rehabilitation

4.4 Biological Resources (Page 4-50)

- Vegetation
  - Forests, Woodlands, and Forest Products
  - Grassland and Shrubland Communities
  - Riparian and Wetland Communities
- Fish and Wildlife Resources
  - Fish
  - Wildlife
- Special Status Species
  - Plants
  - Fish
  - Wildlife
- Invasive Nonnative Species

4.5 Heritage Resources (Page 4-151)

- Cultural Resources
- Native American Concerns
- Tribal Treaty Rights and Trust Responsibilities
- Paleontological Resources

4.6 Land Resources (Page 4-173)

- Lands and Realty
- Renewable Energy
- Rights-of-Way and Corridors
- Livestock Grazing Management
- Recreation
- Travel Management
- Off-highway Vehicles (OHV)
- Visual Resources Management

4.7 Special Designations (Page 4-209)

- Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas
- Wild and Scenic Rivers
- Wilderness Study Areas
- Back Country Byways

4.8 Socioeconomic Resources (Page 4-230)

- Social Conditions
- Economic Conditions
- Health and Safety
- Environmental Justice

4.9 Cumulative Impacts (Page 4-248)

4.10 Irreversible and Irretrievable Commitment of Resources (Page 4-258)

4.11 Unavoidable Adverse Impacts (Page 4-260)

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

This chapter describes environmental consequences that may result from implementing the four alternatives described in Chapter 2. The purpose of this chapter is to analyze and disclose potential significant impacts of the federal action on the human environment. The federal action for this Environmental Impact Statement (EIS) is the Bureau of Land Management's (BLM's) selection of an alternative on which future land use actions would be based.

The potential consequences of each alternative are described in this chapter as impacts using the same order of eight resource topics (e.g., Physical Resources, Mineral Resources, etc.) presented in Chapter 3. Identical organization for chapters 3 and 4 allows the reader to compare existing resource conditions (Chapter 3) to potential impacts (Chapter 4) for the same resources. The analysis of environmental consequences focuses on key planning issues (see Chapter 1) raised during the scoping process rather than providing an encyclopedic discussion of all possible consequences. Each resource or resource use in this chapter is organized as described below. BLM's Land Use Planning Handbook generally defines resources as including natural, biological, and physical resources. BLM's Land Use Planning Handbook (H-1601-1) identifies resource uses to include forestry, livestock grazing, recreation and visitor services, comprehensive trails and travel management, lands and realty, coal, oil shale, fluid minerals, locatable minerals, nonenergy leasables, and mineral materials.

Introduction

The discussion of environmental consequences for each resource program begins with a brief definition of what is considered an impact for the resource. When applicable, definitions of the following types of impacts are also included.

Beneficial/Adverse Impacts. When applicable, beneficial and adverse impacts are differentiated in this chapter. For example, an alternative that increases the number of surface water reservoirs constructed within the Green River watershed is expected to have a beneficial impact on select local fish and recreation; however, if this alternative also increases water depletion (via evaporation) in the Colorado River, it may adversely impact downstream special status species, such as the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. The presentation of both beneficial and adverse impacts for key planning issues is intended to provide the BLM decisionmaker and reader with an understanding of the multiple-use tradeoffs associated with each alternative. However, not all possible impacts are described and, unless otherwise stated, impacts described in this chapter are assumed adverse.

Direct/Indirect Impacts. In general, direct impacts result from activities authorized by the BLM and generally occur at the same time and place as the management activity or action causing the impact. For example, for the action of building a road, a direct adverse impact is surface disturbance. Surface disturbance is the impact (the effect) of heavy equipment (the cause) removing existing vegetation as it grades the proposed road location. Indirect impacts often occur at some distance or time from the action. In the above example, an indirect impact could occur days after the surface is disturbed and some distance from the disturbance. Heavy precipitation following the removal of vegetation and disturbance of the ground surface could erode soil and transport sediment into streams. The impact on stream-water quality is considered an indirect adverse impact.

Short- or Long-Term Impacts. Where applicable, the short-term or long-term aspects of impacts are described in this chapter. For purposes of this EIS, short-term impacts occur during or after the activity or action and may continue for up to five years. Long-term impacts occur beyond the first five years. Five years is an approximation of the time required to reclaim an area following surface disturbance.

Methods and Assumptions

Due to the programmatic and strategic nature of the Resource Management Plan (RMP) alternatives, the timing and specific location of project-specific actions that could impact resource values are not defined. Moreover, the relationship between cause (future actions) and effect (impact on resources) is not always known or quantifiable. For these reasons, the analysis of alternatives is both qualitative and quantitative and based on a series of assumptions. Quantitative analysis refers to the use of numbers for assessing impacts; whereas qualitative analysis is performed where numbers are lacking and relies on general information or professional judgment. The methods and assumptions listed below, and for each resource in the following sections, are disclosed to provide a basis for the conclusions reached in this chapter. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources and resource uses are listed under Methods and Assumptions in the appropriate resource section.

- All alternatives are implemented in compliance with standard practices, best management practices (BMPs), guidelines for surface-disturbing activities, and mitigation guidelines. In other words, these practices and guidelines are considered a component of each alternative.
- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). Because the Secretary of the Interior has the authority and responsibility to protect the environment on lands leased for oil and gas leases, stipulations may be required as conditions of lease issuance. Stipulations become part of the lease and will supersede inconsistent provisions in the standard lease form.
- The Tenth Circuit Court of Appeals in Sierra Club vs. Peterson (717 F.2d 1409, 1983) found that "on land leased without an NSO stipulation, the DOI [U.S. Department of the Interior] cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building."
- Provisions in leases that expressly provide Secretarial authority to deny or restrict development in whole or in part depend on an opinion provided by the U.S. Fish and Wildlife Service (USFWS) regarding impacts to endangered or threatened species or habitats of plants and animals that are listed or proposed for listing. If the USFWS concludes that the development likely would jeopardize the continued existence of any endangered or threatened plant or animal species, then the development may be denied in whole or in part.
- Although not defined as a surface-disturbing activity, concentrated livestock and native ungulate grazing, off-highway vehicle (OHV) use, and fire may remove vegetation and expose the soil surface leading to increased erosion and the opportunity for establishing invasive nonnative species (INNS).
- Comparison of impacts among resources is intended to provide an impartial assessment to inform the decisionmaker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources.
- Key planning issues identified in Chapter 1 provide the focus for the scope of impact analyses in this chapter.

- In general, adverse impacts described in this chapter are considered significant if they result from or relate to the key planning issues described in Chapter 1 and the context or intensity of impacts suggest potential impacts to public health and safety; potential for violating legal standards, laws, or protective status of resources; or potential impacts to unique resources.
- The comparison of individual alternatives is qualitative or quantitative, relative to Alternative A (current management), and based on professional judgment and consideration of the context and intensity of allowable uses and management actions anticipated to impact resources and resource uses.
- Analysis of environmental consequences considered the extent of projected surface disturbance and associated development from BLM actions.
- Analysis assumes the limited anticipated quantity of produced water in the Kemmerer Field Office planning area (planning area) and water-quality regulation by the Wyoming Department of Environmental Quality (DEQ) will avoid significant adverse impacts to water quality in the planning area from well-produced water under any alternative.
- The analysis of impacts reflects the anticipated consequences of alternatives on individual resources; for example, the impact of alternatives on INNS. The anticipated impacts of individual resources on other resources are discussed in the appropriate sections. For example, the impact of INNS on wildlife is described in the wildlife section—not in the INNS section.
- The analysis of impacts focuses on the anticipated incremental and meaningful impact of management actions and allowable uses proposed for each alternative. The impact of past and present actions is encompassed within the description of existing conditions in Chapter 3, Affected Environment.
- The definition of surface-disturbing activities used for analysis is provided in the Glossary (Volume 2). Surface disturbance typically is described in terms of the total acres of short- or long-term disturbance from BLM actions, as shown in Table 4-1. Refer to Appendix M for projected surface disturbance associated within individual reasonable foreseeable actions (RFAs). Surface disturbance for new wells that are later abandoned is reclaimed and accounted for in surface disturbance acreage in Appendix M. See Appendix N for the Wyoming BLM mitigation guidelines for surface-disturbing and disruptive activities.
- Under all alternatives, appropriate threatened and endangered species surveys will be conducted, where applicable, during the appropriate season.
- No surface occupancy (NSO) or controlled surface use (CSU) restrictions proposed in this RMP can be applied to new oil and gas leases only. Stipulations on existing leases will continue as they are. New constraints and requirements identified in the approved plan may be applied to subsequent exploration and development activities on existing leases through the use of Conditions of Approval, provided they are within the authority reserved by the terms and conditions of the lease.
- New rights-of-way (ROW) and all other BLM authorizations will comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA).
- Sylvatic plague can have disastrous impacts on prairie dog populations. While sylvatic plague can be reduced by population management, no action can entirely remove the threat of plague.
- Recreational shooting is considered a casual use, unless conducted at a gun range. Impacts would be addressed under the BLM Hazardous Materials Program, Lands and Recreation programs.

- BLM, in cooperation with state and other federal wildlife agencies, is responsible for managing habitats (e.g., quality, suitability, usability), whereas state and federal wildlife management agencies (e.g., the Wyoming Game and Fish Department [WGFD], USFWS) have primary authority for overseeing management of wildlife populations.
- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surface, changes in water routing, and loss of vegetation.
- It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream and contribute to the loss of riparian functionality.
- Livestock and wildlife use are typically disproportionately higher in riparian communities than in upland communities. Improper grazing can adversely impact these communities throughout the year, but generally, greater impacts occur in the spring and early summer, when soils are wet and more vulnerable to compaction and when stream banks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid to late summer). While stocking rates for an allotment or pasture may be low to moderate, the utilization levels in riparian areas can be high.
- The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) set forth standards that apply to all activities. Applying the Guidelines is generally effective in managing the impacts to vegetation health, as well as soils, by minimizing erosion impacts that may be caused by domestic livestock grazing. Adjustments to grazing authorizations are made on a case-by-case basis when site-specific studies indicate changes in management are required.

Table 4-1. Total Projected Surface Disturbance from BLM Reasonable Foreseeable Actions in the Kemmerer Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Total Acres Short-Term Disturbance from BLM Actions	214,120	106,175	172,967	147,262
Total Acres Reclaimed from BLM Actions	69,447	58,482	28,500	69,721
Total Acres Long-Term Disturbance from BLM Actions	144,673	47,693	144,467	77,541

Source: Appendix M, Table M-1
BLM Bureau of Land Management

Analysis of Alternatives

The analysis of alternatives describes how each alternative could affect baseline conditions of individual resources in the planning area. Impacts typically are described by topic such as surface disturbance, other resources or resource uses, and proactive management actions. Proactive management actions generally include management actions anticipated to protect or enhance the resource of interest. For example, proactive management actions for soils include prohibiting or restricting surface-disturbing activities on steep slopes or highly erosive soils. If a particular allowable use or management action is not discussed for a resource, it is because no impacts are expected or the anticipated impact is not considered significant.

Conclusion

The conclusion section for each resource and resource use briefly highlights the overall impacts of alternatives relative to which alternatives are projected to have the most and least impacts. Action Alternatives are compared to the No Action Alternative (Alternative A). In some cases, there are no discernable differences in impacts from alternatives.

Cumulative Impacts

Cumulative impacts are described in the Cumulative Impacts section of this chapter. Cumulative impacts combine the past and present impacts encompassed in existing conditions described in Chapter 3 with the anticipated incremental impacts of alternatives described in the sections of this chapter and the impacts of reasonably foreseeable future actions. The Cumulative Impacts section also includes anticipated incremental impacts of non-BLM RFAs.

4.1 Physical Resources

4.1.1 Air Quality

Actions that could occur through implementing each alternative could affect future air quality levels within the project region. This section describes the impacts of each alternative on air quality in terms of short-term and long-term impacts.

4.1.1.1 Methods and Assumptions

The air quality analysis estimated emissions associated with proposed management actions for each project alternative. The analysis focused on emissions associated with operational emissions approximately 10 and 20 years in the future (years 2011 and 2020). As a reasonably conservative approach, the analysis included the peak annual construction emissions to years 2011 and 2020 operational emissions to estimate total annual emissions for these years. Years 2011 and 2020 emissions were compared to year 2001 existing emissions to determine the future change in emissions levels for each project alternative. Refer to Appendix J for the Technical Support Document for Air Quality.

Activity data used to estimate emissions for proposed emissions sources were obtained from Kemmerer Field Office staff and National Environmental Policy Act (42 United States Code [USC] § 4321 et seq.) (NEPA) analyses performed for BLM actions within Wyoming that are similar to those associated with the actions proposed in this EIS (BLM 2002g; BLM 2006b). Emissions factors used to estimate proposed emissions were obtained from (1) the U.S. Environmental Protection Agency (EPA) NONROAD Emissions Model (EPA 2004); (2) Wyoming DEQ best available control technology (BACT) levels for natural gas-fired internal combustion engines (Hanify 2006; Wyoming DEQ 2000); (3) MOBILE6 emissions models for on-road vehicles (EPA 2003); and (4) special studies on fugitive dust emissions. The Technical Support Document for Air Quality (Appendix J) includes data and assumptions used to estimate emissions for each project alternative.

Methods and assumptions used in this impact analysis include the following:

- Stationary sources associated with oil and gas development operate at emissions levels based on currently observed BACT levels.
- Activity data associated with management actions other than those related to oil and gas and coalbed natural gas (CBNG) wells were averaged over the entire analysis period to produce annual average emissions.
- EPA off-road emissions standards were used to estimate emissions for nonroad sources in project years 2006/2011/2020. This approach simulated the replacement of existing sources by new lower-emitting equipment with future EPA off-road emissions standards.
- The analysis in this section estimated emissions only from activities that would occur on federal lands within the planning area.
- Use of water application as a Best Management Practice (BMP) reduced fugitive dust emissions from surface-disturbing activities during construction, reclamation, and maintenance of roads by 50 percent from uncontrolled levels.

The analysis calculated emissions for the following 13 types of development and use activities: (1) oil development, (2) CBNG and conventional natural gas development, (3) coalmine development, (4) salable and locatable minerals development, (5) renewable energy development, (6) livestock management activities, (7) vegetation management, (8) fire management (including prescribed fire), (9) forest and woodlands activities, (10) ROW, (11) OHV use, (12) resource roads, and (13) trona mining and

processing. Activities related to cultural resources, paleontology, recreation, noxious and invasive weed control, and wildlife and fish would produce inconsequential amounts of air emissions.

The project region for air quality includes the planning area and federal Class I areas within 100 miles. The nearest federal Class I areas to the planning area are the Grand Teton National Park (approximately 30 miles to the north), the Bridger National Wilderness Area (approximately 40 miles to the east), and the Teton Wilderness Area (approximately 50 miles to the north). Table 4-2 summarizes the annual emissions under each alternative.

4.1.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact air quality include management actions that reduce emissions or may result in increased emissions. The impacts projected to occur to air quality as a result of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary by alternative.

Impacts Common to All Alternatives

Proposed management actions associated with each project alternative will decrease or increase impacts to air quality, depending on whether they eliminate existing emissions sources or increase emissions from current levels. Air quality impacts from these actions primarily result from minerals development and production, as potential emissions associated with these actions substantially outweigh those produced from any other proposed activity. BLM would require that potential impacts from any proposed project under this RMP are consistent with federal land management guidance, in consultation with state and other federal agencies.

Table 4-2. Total Annual Emissions Summary for BLM Activities within the Kemmerer Planning Area

Summary Year	Emissions (tons per year)						
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO	VOC	HAP
Base Year (2001) Totals	2,840	2,244	7,987	5,131	6,372	13,673	1,128
Alternative A							
2011 Total	4,209	2,461	8,123	5,131	7,364	12,921	1,058
2020 Total	3,053	2,300	8,031	5,132	7,919	13,175	1,088
Alternative B							
2011 Total	4,142	2,439	7,894	5,102	7,173	11,743	938
2020 Total	2,963	2,262	7,645	5,103	7,541	11,429	909
Alternative C							
2011 Total	4,142	2,451	8,124	5,131	7,364	12,936	1,059
2020 Total	4,177	2,468	8,034	5,132	7,921	13,197	1,091
Alternative D (Preferred Alternative)							
2011 Total	4,209	2,461	8,115	5,130	7,357	12,898	1,055
2020 Total	3,649	2,388	8,025	5,132	7,911	13,159	1,087

Source: Appendix J
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
SO_x sulfur oxides
VOC volatile organic compound

Short-term air quality impacts from minerals development and production occur from six sources: (1) combustive emissions (vehicle tailpipe and exhaust stack emissions) due to the operation of mobile and stationary source construction equipment, (2) fugitive dust emissions (particulate matter less than 10 microns in diameter [PM_{10}]) due to earthmoving activities and the operation of vehicles on unpaved

surfaces, (3) nitrogen oxides (NO_x) emissions from blasting, (4) particulate emissions from blasting, (5) coal fines blowing off trains hauling coal out of the basin, and (6) diesel emissions from those same trains. Minerals production generates long-term combustive and fugitive dust emissions from two sources: (1) stationary sources, such as natural gas flaring, natural gas-fired compressors, and minerals storage, processing, and handling equipment; and (2) mobile sources that access and service oil and gas facilities and extract and handle subsurface minerals, such as coal and hard minerals. An example of minerals production that, even though it occurs on private land, emits plumes visible on BLM-managed lands is trona processing, which is concentrated in a fairly small segment of the planning area. These plumes are most evident during winter air inversions. Minerals reclamation activities also produce combustive and fugitive dust.

There is a potential of ozone formation from operational activities. Ozone is a secondary pollutant formed from emissions of volatile organic compounds (VOCs) and NO_x, in the presence of sunlight. The potential for ozone formation in BLM Wyoming planning areas is being addressed in detailed modeling exercises, such as the Pinedale Anticline Supplemental EIS – BLM modeling and monitoring ozone supplement, planned for release March 2007.

The project alternatives could impact air quality-related values (AQRV)s within federal Class I areas listed in Chapter 3. Although minerals development and production are the primary sources of emissions, other resource management actions that could produce combustive and (or) fugitive dust emissions include the following:

1. Forestry production due to road construction, logging equipment usage, slash burning, and prescribed burns.
2. Fire management due to the combustion of vegetation from prescribed fire and wildland fire, combustive emissions from the use of fire suppression equipment, and fugitive dust from the use of fire suppression equipment on unpaved roads; emissions from prescribed and wildland fires depend on fuel and meteorological conditions.
3. Road maintenance due to the use of grading equipment on unpaved roads.
4. ROWs due to combustive and fugitive dust emissions from equipment used to construct proposed infrastructure.
5. OHV use due to combustive and fugitive dust emissions.

The Wyoming DEQ has the authority to implement emissions controls for sources requiring air permits under the Wyoming Air Quality Standards and Regulations and to ensure that these sources do not contribute to an exceedance of an ambient air quality standard. To facilitate this process, the BLM currently implements a program to share emissions source information with the Wyoming DEQ and other government agencies. This program continues under all alternatives. The planning area activities that impact air quality have not changed appreciably since 2001. Approximately the same number of oil and gas drilling rigs are operating in the planning area. In addition, the BLM requires implementing BMPs within its authority to minimize impacts, such as fugitive dust emissions, in proximity to high use roadways, populated areas, and resource-sensitive areas.

Alternative A

Figure 4-1 presents a summary of annual emissions for the base year (2001) and for 2011 for each alternative. Figure 4-2 presents a summary of annual emissions for the base year and for 2020 for each alternative. The detailed spreadsheets serving as the basis of these charts, along with the emissions calculations and summary tables, are provided in Appendix J.

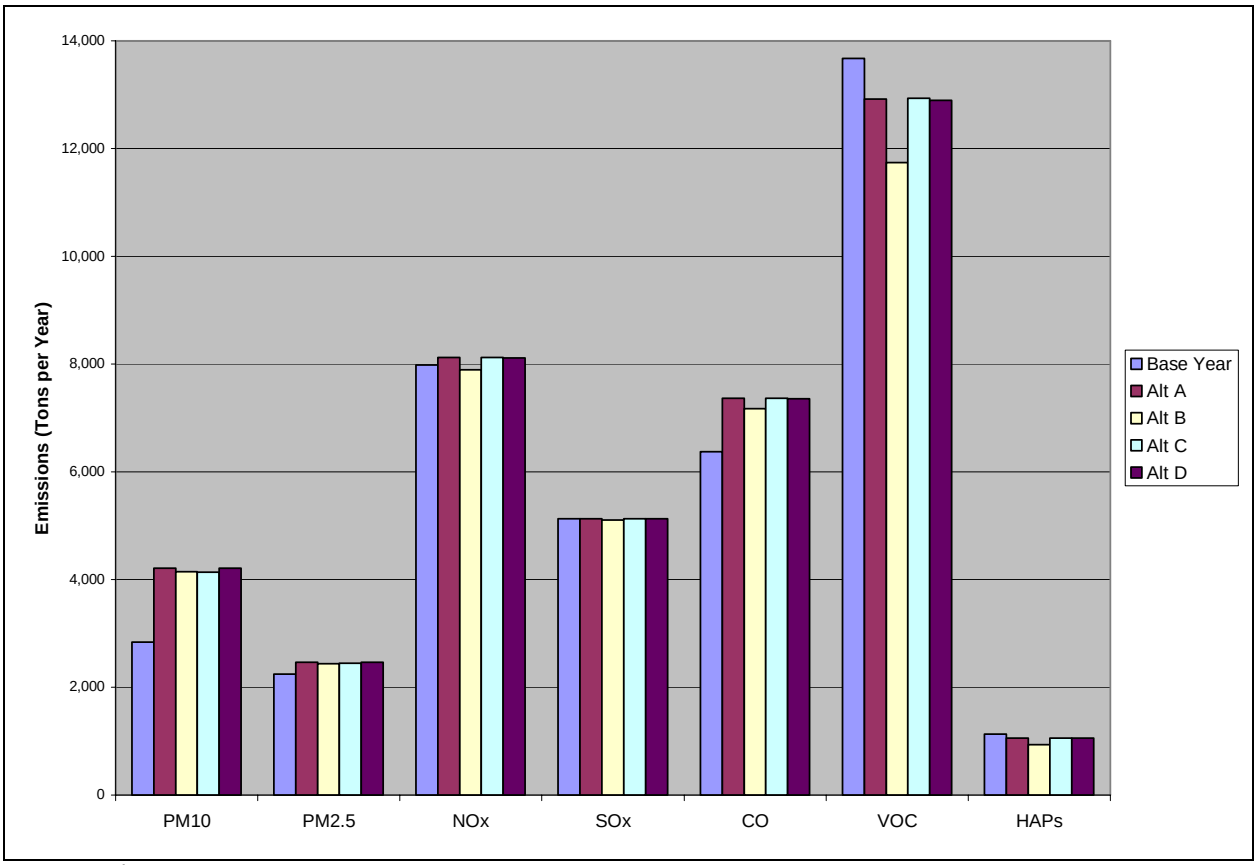
Figure 4-2 also shows that Alternative A results in increased emissions levels for five of the seven pollutants by 2020, compared to existing conditions in year 2001. The increases are projected to be

carbon monoxide (CO), NO_x, sulfur oxides (SO_x), $PM_{2.5}$, and PM_{10} emissions, increasing by 1,546 tons (24%), 44 tons (1%), 2 tons (0.03%), 56 tons (2%), and 213 tons (8%), respectively, from 2001 levels. VOC and hazardous air pollutant (HAP) emissions are projected to decline. The largest source of these increased emissions is the new development of oil and natural gas production in the planning area.

The planning area is a large irregularly shaped area with a maximum east-west extent of 75 miles and a north-south extent of 140 miles. Given the generally good air quality existing in the project region and the expected separation of sources within the planning area, it is unlikely emissions from Alternative A would contribute to an exceedance of a national or state ambient air quality standard. Depending on the locations and emissions levels of proposed sources in the area, the surrounding topographical characteristics, and the site-specific meteorology, localized air quality impacts could occur.

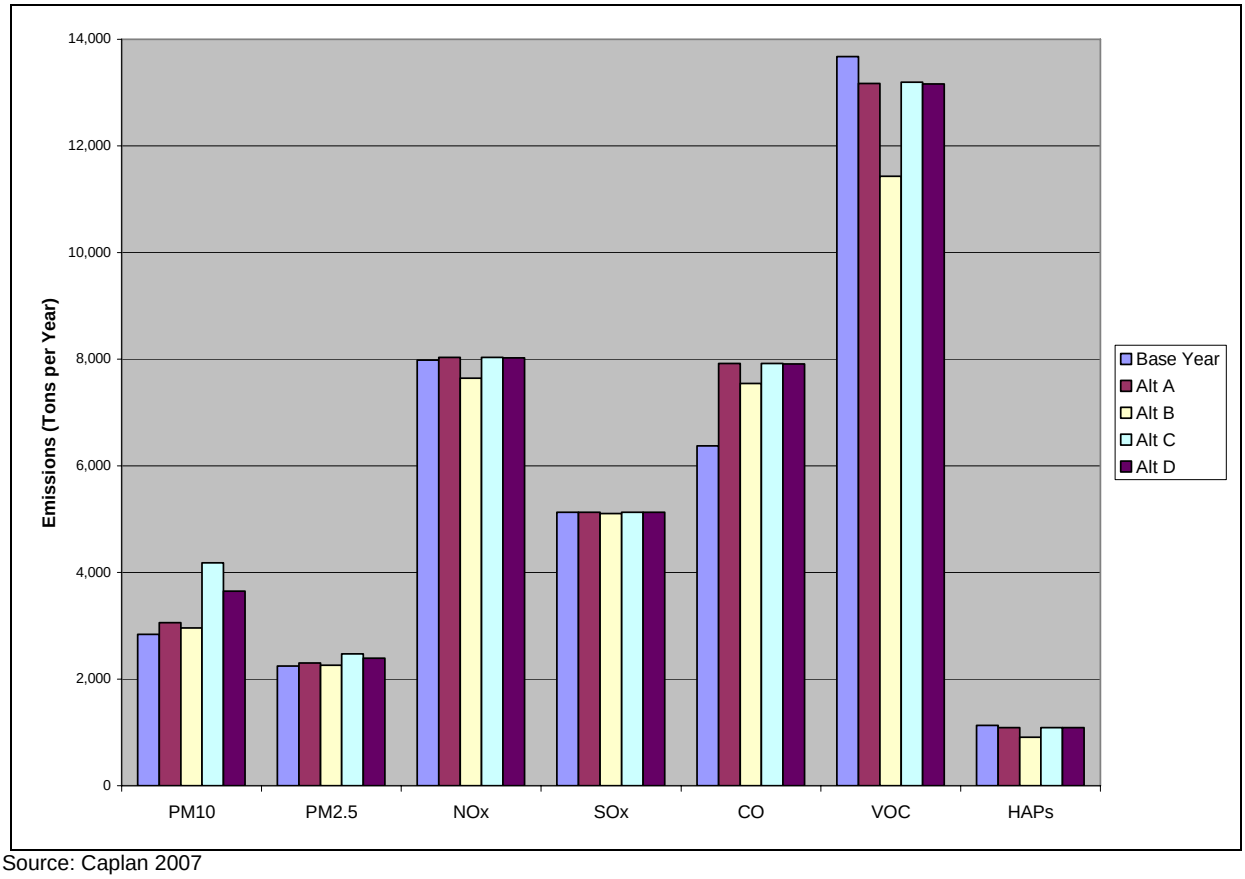
The impacts of these future air emissions at pristine Class I areas under Alternative A are difficult to estimate with any level of confidence without information on the specific locations and characteristics of projected sources in the planning area. Detailed air dispersion modeling can be used to estimate these impacts, but the modeling is sensitive to atmospheric conditions and to the exact locations and the emissions levels of the proposed sources in the planning area. In addition, the Wyoming DEQ air-permitting processes require larger development projects to identify the locations for specific emissions sources to demonstrate with dispersion modeling analyses that proposed emissions would not adversely impact AQRVs in Class I areas.

Figure 4-1. Projected Emissions from Activities on BLM-Administered Land and Mineral Estate in the Kemmerer Planning Area: Year 2011



Source: Caplan 2006

Figure 4-2. Projected Emissions from Activities on BLM-Administered Land and Mineral Estate in the Kemmerer Planning Area: Year 2020



Source: Caplan 2007

In addition to the proposed sources of HAPs within the planning area, there could be emissions of hydrogen sulfide (H_2S). These sources include fossil fuel combustion, fugitive VOCs, and emissions due to oil and gas production. The accidental release of sour natural gas (rich in H_2S) poses the main risk under Alternative A. Another source of release of H_2S is at oil and gas fields where secondary recovery operations are occurring. To mitigate H_2S impacts, applications for permit to drill in sour gas areas include a contingency plan possibly including requirements to monitor wind speed, wind direction, and atmospheric stability; conduct dispersion modeling analyses; and develop a notification plan. These requirements would apply to areas where public health and safety or important resource values are a concern, such as proposed well sites in proximity to residences. If the BLM determines after review of a contingency plan that additional data or safety precautions are needed, the BLM will require these items as conditions of approval (COA). The potential release of H_2S during production operations in sour gas areas may be mitigated by health and safety plans.

The BLM is considering implementing mitigation actions within its authority to reduce emissions under Alternative A, such as selecting projects with smaller area coverage, fewer units, or less ground disturbance, or choosing projects with improved designs that minimize air emissions. The BLM will use dispersion modeling to estimate the impacts of projects whose emissions have not been analyzed before, but might be substantive. If an analysis shows that substantial impacts are possible, mitigation measures similar to those presented in Appendix L may be recommended. The BLM also will facilitate discussions with stakeholders to implement mitigation beyond the BLM's authority to reduce proposed emissions,

including considering a program to offset emissions from proposed projects, and reducing emissions from existing sources by techniques such as retrofits with more stringent BACT.

Alternative B

Figure 4-1 and Figure 4-2 present an estimate of base year and future annual emissions for each alternative in years 2011 and 2020, respectively. Figure 4-2 shows that compared to the 2001 base year emissions, in 2020, Alternative B results in the lowest emissions of any of the alternatives. The largest increase in terms of percent of 2001 emissions is for CO (an increase of 1,169 tons, or 18%); PM_{10} would also increase slightly (123 tons or 4%), as would $PM_{2.5}$ (18 tons or 1%), but all other pollutants would decrease from 2001 levels.

As a result, under this alternative, impacts on AQRVs at the nearest Class I areas would be similar to base year conditions. In addition, given the generally good air quality existing in the project region, emissions from Alternative B have the lowest potential to contribute to an exceedance of National Ambient Air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS). Implementing the mitigations identified for Alternative A also reduces emissions and air quality impacts associated with Alternative B.

Alternative C

Figure 4-2 shows that Alternative C results in moderately increased emissions levels for all pollutants by 2020, compared to existing conditions in year 2001. In terms of percentage gain, the most substantive increases are projected to be PM_{10}, CO, and $PM_{2.5}$ emissions, with increases of 1,337 tons (47%), 1,549 tons (24%), and 225 tons (10%), respectively, from 2001 levels. Emissions of NO_x would increase by 0.6% compared to existing conditions, and emissions of sulfur dioxide (SO_2) would increase by about 0.03%. As shown in Figure 4-2, the emissions increases under Alternative C over base year conditions were essentially the same as those in Alternative A, except for PM_{10} and $PM_{2.5}$ emissions, which were higher than in Alternative A. The primary source of these increased emissions from base year conditions is the new development of renewable energy and oil and natural gas production in the planning area.

The air quality impacts under Alternative C are similar to the impacts under Alternative A, but with more PM_{10} and $PM_{2.5}$ impacts. Nevertheless, it is likely that emissions under Alternative C have a low potential to contribute to an exceedance of an NAAQS or WAAQS due to the generally good air quality existing in the project region. In addition, since emissions increases will be spread over relatively large distances, this alternative is not expected to cause adverse impacts to AQRVs in the nearby National Wilderness Areas (NWAs). Implementing the mitigations identified for Alternative A also will reduce emissions and air quality impacts associated with Alternative C.

Alternative D (Preferred Alternative)

Figure 4-2 shows that Alternative D will result in moderately increased emissions levels for all pollutants by 2020, compared to existing conditions in year 2001. In terms of percentage increase, the most substantial increases were projected to be PM_{10}, CO, and $PM_{2.5}$ emissions, with an increase of 809 tons (28%), 1,539 tons (24%), and 145 tons (6%), respectively, from 2001 levels. Emissions of NO_x would increase by 0.5% compared to existing conditions, and emissions of SO_2 would increase by about 0.03%.

The air quality impacts under Alternative D are similar to the impacts under Alternative A, but with more PM_{10} and $PM_{2.5}$ impacts. Nevertheless, it is likely that emissions under Alternative D have a low potential to contribute to an exceedance of an NAAQS or WAAQS due to the generally good air quality existing in the project region. In addition, since emissions increases will be spread over relatively large distances, this alternative is not expected to cause adverse impacts to AQRVs in the nearby NWAs. Implementing the mitigations identified for Alternative A also will reduce emissions and air quality impacts associated with Alternative D.

4.1.1.3 Conclusion

Alternative B results in the least amount of development and the most land use restrictions; therefore, it is the alternative with the lowest levels of air emissions in 2011 and 2020. Compared to base year emissions, Alternative B could result in relatively small increases in some pollutants, such as PM_{10} and CO, a substantial decrease in NO_x, VOC, and HAP emissions, and a small decrease in SO_2 emissions compared to 2001. Alternative B is expected to have the lowest potential for exceedances of ambient air quality standards or cause adverse impacts on AQRVs in Class I areas.

Alternatives A, C, and D could result in increases of PM_{10}, $PM_{2.5}$, and CO, as well as NO_x (although the estimated percentage increase is always less than 1 percent) and SO_2 (although the estimated percent increase is less than 0.1% for all alternatives). These alternatives also have lower emissions of VOCs and HAPs compared to 2001 conditions. The emissions levels among these alternatives are very similar, except for PM_{10}, which is somewhat higher for Alternative C due to increased development of renewable energy. Because new or expanded individual development projects are likely to be widely separated throughout the planning area and current measured air quality concentrations are well below federal and Wyoming standards, it is unlikely that the increased emissions will contribute to an exceedance of a national or state ambient air quality standard.

4.1.2 Soil

Stable and productive soil in the planning area provides the foundation for other resources (e.g., biological resources) and for resource uses (e.g., livestock grazing). Actions that disturb or compact soil, disrupt soil stability, or reduce soil productivity are considered adverse impacts. Conversely, beneficial impacts to soil include actions that stabilize soil or increase soil productivity. Those actions that avoid or minimize soil compaction or erosion, stabilize soil, or increase soil productivity are beneficial.

Most allowable uses could affect soil resources to some degree. Appendix M identifies projected surface disturbance acreage resulting from all RFAs. The BLM actions most likely to cause the greatest amount of short-term disturbance are mineral development, wildland fire suppression, road and trail development, and the reclamation of disturbed areas. Developing coal resources will produce the greatest amount of long-term disturbance resulting from a BLM-approved action. Surface-disturbing actions will result in removal of vegetative cover, soil compaction, reduced infiltration, changes in physical and biological properties, reduction in organic matter content, reduced productivity, and increased erosion rates. These direct impacts to soils tend to result primarily from removing the vegetative cover, loosening the surface soil, the formation of compacted layers, and increasing the potential for accelerated erosion by exposing soil particles to wind and water. Construction of roads, well pads, and other facilities results in a loss of soil productivity through disruption of natural soil horizons and removal of vegetation.

Indirect impacts caused by disrupting soil stability, increased compaction, and reduced productivity include (1) sedimentation of drainages and perennial water bodies primarily by wind or water erosion, (2) particulate matter affecting air quality through wind erosion, (3) reduced infiltration, (4) an increase in surface water runoff that could cause higher peak streamflows and possibly downstream flooding, (5) changes in surface water quality caused by exposing soils with undesirable chemical characteristics, and (6) loss of wetland soil characteristics and vegetation through accelerated soil drainage and reduced infiltration. These indirect impacts are minimized through implementing BMPs and developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) and erosion and sediment control plans, as required under the Wyoming Pollutant Discharge Elimination System (WYPDES). Compliance with Wyoming DEQ requirements for a stormwater permit for Construction General Permit for surface disturbances of 1 acre or more and erosion, restoration, and revegetation plans are BLM requirements.

Surface uses that may not result in direct surface disturbance, but may affect soil stability through changes in vegetative cover or soil infiltration rates, include grazing by livestock and wildlife (if grazing damages vegetative cover beyond its ability to recover in a timely manner), vegetative treatments, and

OHV use (especially cross-country travel). Operating motorized vehicles on moist soils, especially heavy equipment, is likely to cause compaction of the surface layer, which may increase runoff, decrease infiltration and aeration, and reduce soil productivity by making it more difficult for plant roots to establish or obtain soil moisture and nutrients.

Short-term impacts to soils may result from initial surface disturbance prior to reestablishing vegetation or installing other practices that minimize wind and water erosion. The amount of bare ground predicted under each alternative after successful reclamation of disturbed areas is important to consider when evaluating long-term impacts to soils. Areas not reclaimed, leaving bare ground, include roads and areas around facilities that sustain concentrated surface uses by equipment or are necessary to prevent the potential for fire from the equipment. Other long-term impacts to soils include the loss of productivity in areas where facilities and structures are built due to soil removal or alteration of the soil profile. For the purpose of this analysis, long-term impacts due to accelerated erosion occur in locations where bare soils are allowed to remain exposed to wind and water for more than 5 years. Other long-term impacts to soils include the loss of productivity due to soil removal or alteration of the soil profile. Refer to Maps 4 through 6 for soils.

4.1.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Due to the lack of detailed soil surveys for the planning area, impacts to soils are described in qualitative terms based on general characteristics of the five geomorphic soil groups as outlined in Chapter 3. A soil survey for portions of the planning area currently is under way and may be used for future planning under all alternatives.
- The majority of the soils susceptible to wind and water erosion are located within the Green River Basin Uplands. Soils along the upland ridges in the Overthrust Belt soil group are highly susceptible to water erosion.
- Bare soil (without vegetation or other surface cover) with a surface layer that has been altered from its natural condition is more susceptible to accelerated wind and water erosion than undisturbed soil.
- Erosion from well pads is minimal once vegetation is reestablished. Successful establishment of vegetation generally takes a minimum of 3 years, depending on soil and precipitation, and requires monitoring during this time.
- The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) provide minimum standards for vegetation health, vigor, soil cover, and erosion rates that apply to all BLM administered activities in the Standards portion of the document. The Guidelines portion of the document focuses on grazing activities.
- Projected surface disturbance for each alternative potentially modifies soils by disrupting soil stability, changing vegetative cover, damaging biological crusts, decreasing productivity, and increasing compaction. When these modifications occur on highly erodible soils, the potential for accelerated erosion is greater than on less erodible soils (USFS 2004). Site-specific erosion predictions and calculations require detailed soil mapping of areas to be disturbed. Soil mapping during site-specific analysis enables the BLM to minimize disturbance of highly erodible or otherwise sensitive soils.
- Sensitive soils incur greater adverse impacts from surface-disturbing activities than nonsensitive soils. Sensitive soils are fragile and especially susceptible to adverse impacts from surface disturbance because they are highly erodible and saline, sodic, or alkaline, or have a low reclamation potential.

- Most soils with high water erosion potential within the planning area occur on steep slopes (greater than 15%).
- Installing and maintaining erosion controls and other mitigation measures, such as BMPs, result in a substantial reduction in soil erosion, depending on site conditions (Appendix O). However, these measures may not reduce adverse soil compaction and productivity impacts.
- The risk of BMP failure is greater on highly erodible soils. To be effective on highly erodible soils, more extensive BMPs and more aggressive maintenance techniques than those commonly used are often required. The risk of implementing BMP failure is greater on highly erodible soils.

4.1.2.2 Analysis of Alternatives

The types of impacts projected to occur to soils because of the various alternatives are similar under all alternatives; however, the intensity of the impacts is anticipated to vary by specific allowable uses and management actions associated with individual alternatives, as described below. The following sections describe the anticipated impacts to soils from individual alternatives by categories anticipated to have a measurable difference among alternatives: surface-disturbing activities, OHV use, fire and fuels management, and proactive management actions.

Impacts Common to All Alternatives

Soils on BLM-administered lands could be disturbed under each alternative by activities proposed across a variety of resource programs. Appendix M lists projected surface disturbance for activities anticipated under each alternative over the life of this plan. Refer to Table 4-1 for acres of long-term and short-term surface disturbance that may affect soils under each alternative.

To gain an understanding of the amount of surface-disturbing activities projected to occur within each soil group, Table 4-3 summarizes the percentage of each soil group subjected to oil and gas leasing constraints and serves as an indicator of the impacts to soils that could occur under each alternative. The table is intended to be used to compare the level of soil protection from surface disturbance across the alternatives within each soil group. An area that is administratively unavailable for leasing indicates the highest level of restrictions on oil and gas development under new leases. Major constraints on leases include limitations that would exclude or minimize surface disturbance and bare ground during development of oil or gas wells. A soil group with a high percentage of major constraints can be expected to result in less surface disturbance than groups with less restrictive leases. Areas with moderate constraints have fewer restrictions on surface disturbance and would therefore be likely to allow more surface-disturbing activities and bare ground in areas with high potential to be developed for producing oil and gas. Table 4-3 only lists those areas with greater limitations or constraints than are attached to leases with standard stipulations. The percentages within each geomorphic soil group under each alternative do not total 100 percent because the remainder is the acreage to be leased under standard terms and conditions with few constraints.

An example of the application of Table 4-3 is to consider the Green River Basin Uplands soil group, which is the largest in the planning area with soils that are relatively susceptible to erosion, so a relatively high percentage of major constraints on leasing (as under Alternative B) is likely to prevent or minimize impacts to erodible soils. Alternatives with more acreage of major constraints and administratively unavailable lands within the Green River Basin Uplands soil group are more likely to protect soils from erosion compared to alternatives with less acreage of those constraints. Table 4-4 identifies the percentage of the impacts subjected to oil and gas leasing constraints on federal mineral estate in the planning area.

Table 4-3. Constraints on Oil and Gas Leasing and Development on Federal Mineral Estate by Soil Group

Geomorphic Soil Group	Constraint	Alternative			
		A	B	C	D *(Preferred Alternative)*
Overthrust Belt	Administratively Unavailable for Leasing	5%	60%	5%	15%
	Major	25%	34%	24%	16%
	Moderate	53%	5%	55%	66%
Green River Basin Uplands	Administratively Unavailable for Leasing	9%	37%	9%	9%
	Major	23%	54%	22%	21%
	Moderate	52%	7%	52%	62%
Mountainous Areas	Major	5%	85%	5%	5%
	Moderate	71%	15%	71%	82%
Relict Alluvial Fans and High Outwash Terraces	Major	12%	88%	11%	11%
	Moderate	71%	12%	73%	83%
Floodplains	Administratively Unavailable for Leasing	11%	39%	11%	18%
	Major	41%	59%	35%	35%
	Moderate	47%	2%	52%	46%

Table 4-4. Summary of Constraints that Limit Oil and Gas Development

Constraints on Mineral Leasing (% of Federal Mineral Estate)	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Administratively Unavailable	7%	45%	7%	12%
Major Constraints	23%	48%	22%	18%

Alternative A

Surface-disturbing Activities. Surface-disturbing activities on public land under Alternative A are evaluated on a case-by-case basis. Authorizations prescribe mitigation that reduces impacts to soils from surface-disturbing actions.

Under Alternative A, the projected short-term disturbance from all BLM actions will affect 214,120 acres. Following reclamation of disturbed sites, an estimated 144,673 acres are anticipated to be affected in the long term from BLM actions under Alternative A (see Appendix M). An estimated 30 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains and Green River Basin Uplands soil group, where the majority of highly erodible soils and the greatest potential for oil and gas development occur. The lack of specific soil protection management actions under this alternative may result in accelerated erosion in some areas.

Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 25 percent, is the existing management and has resulted in the present conditions.

Surface-Use Activities. The majority of the planning area is designated as limited to existing roads and trails for OHV use; however, inappropriate use of these vehicles can cause undue environmental degradation and accelerate soil erosion. Accelerated erosion resulting from OHV use is not quantified, but generally is limited to isolated incidences within the planning area.

Prescribed fire is used in accordance with treatments identified by range, wildlife, and forestry programs. Mitigation measures incorporated into the fire prescription generally are effective at controlling accelerated soil erosion. Limitations on soil disturbance during fire suppression minimize adverse impacts to soils.

Proactive Management Actions. Existing management actions intended to protect soils include modifying surface-disturbing activities, implementing timing restrictions, and prohibiting surface disturbance in selected areas to reduce erosion based on site-specific evaluations. These management actions to protect soil are evaluated on a case-by-case basis.

Alternative B

Surface-disturbing Activities. Under this alternative, projected short-term disturbance from all BLM actions will affect 106,175 acres, the least of any alternative. Following reclamation of disturbed sites, the projected long-term disturbance acreage is 47,693 acres (see Appendix M). Under Alternative B, an estimated 93 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Green River Basin Uplands soil group, where the majority of the highly erodible soils occur.

This alternative allows the fewest acres subjected to surface disturbance and protects the most acres within the Floodplains and Green River Basin Uplands, and Overthrust Belt soil groups resulting in the least erosion potential and the best long-term soil productivity of the alternatives. Moreover, the prohibition of surface-disturbing activities on highly erosive soils with 10 percent or more slopes without adequate mitigation measures and other fragile soil areas will result in improved protections and reduce accelerated erosion rates, as compared to Alternative A.

Surface-Use Activities. Management of surface use activities under Alternative B are more stringent compared to Alternative A, resulting in increased protections from accelerated soil erosion. For example, compared to Alternative A, seeding of salvaged topsoil piles is required upon completion of construction activities, and surface disturbance during fire suppression is not allowed without the consent of the authorized officer.

Proactive Management Actions. Compared to all alternatives, management actions on public lands under Alternative B are the most protective of soil resources. Moreover, identifying other Management Areas (MAs) under Alternative B may further protect soils from accelerated erosion in some areas.

Alternative C

Surface-disturbing Activities. Under Alternative C, the potential for adverse impacts to soils through reduced stability and productivity and increased compaction is the same as that described for Alternative A. The projected short-term disturbance acreage (172,967 acres) and long-term acreage (144,467 acres) from BLM actions under Alternative C will be the second highest of all alternatives (see Appendix M). Under Alternative C, an estimated 29 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains and Green River Basin Uplands soil groups, where the majority of highly erodible soils occur. Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 25 percent, are the same as under Alternative A.

Surface-Use Activities. Management of surface-use activities under Alternative C is similar to that as described under Alternative A, resulting in similar impacts to soils.

Proactive Management Actions. Under Alternative C, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to soils are similar to or slightly greater than those described under Alternative A. Adverse impacts to soils under Alternative A are, therefore, anticipated to be similar to or slightly greater compared to Alternative A.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, the potential for adverse impacts to soils through reduced stability and productivity and increased compaction is less than described for alternatives A and C. The projected short-term disturbance acreage (147,262 acres) and long-term acreage (77,541 acres) from BLM actions under Alternative D will be less than that predicted for Alternative A (see Appendix M). Under Alternative D, an estimated 30 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains, Green River Basin Uplands, and Overthrust Basin soil groups, where the majority of the highly erodible soils occur. Standard BMPs and mitigation, combined with development restrictions on slopes greater than 20 percent, are anticipated to be slightly more effective in mitigating impacts to soils compared to alternatives A and C.

Surface-Use Activities. Management of surface-use activities is similar to that as described under Alternative A, resulting in similar impacts to soils.

Proactive Management Actions. Under Alternative D, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to the soil resources are greater than those described under Alternative A and slightly less than those for Alternative B.

4.1.2.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to determine the potential impacts to soil resources. Meaningful differences in long-term disturbance acreage, fire-suppression tactics, lands that are administratively unavailable or allow NSO relative to fluid minerals on steep slopes, and reclamation requirements form the basis for the following conclusion. Alternative B is anticipated to produce the least potential adverse impacts to soil resources because management actions are anticipated to result in less soil disturbance and potential soil compaction. Therefore, Alternative B is anticipated to conserve more soil resources. Alternative D is anticipated to produce more soil compaction and erosion relative to Alternative B, but will potentially result in somewhat less adverse impacts to soil resources than alternatives A and C. The alternatives listed in ascending order from the least potentially adverse to the most potentially adverse in terms of impact on soil resources are Alternative B, D, C, A.

4.1.3 Water

This section describes impacts to surface water quality, surface water quantity, and groundwater quality and quantity. For this analysis, short-term impacts include those actions that degrade surface water quality, change surface water flows, or change groundwater quality and quantity as a result of unstable soils or poor watershed condition until revegetation or other reclamation can be established (up to 5 years). Refer to Map 7 for water resources.

Surface Water Quality

Direct impacts to surface water quality result from activities that degrade the ambient water quality of surface waters in the planning area. Indirect impacts include actions that disturb soil, especially highly erodible soil. Indirect impacts to surface water quality also may result from activities that modify drainages in the planning area. For example, actions that change the number of road-stream crossings or the distribution and condition of wetlands and riparian areas could indirectly result in changes to surface water quality. Wetlands and riparian areas filter pollutants contained in runoff before they enter the stream system.

Beneficial impacts to surface water quality include actions that minimize, reduce, or prevent offsite erosion or the disposal of supplemental water that is of lower quality than the ambient water quality of the receiving water. An adverse impact to water quality is any action resulting in a violation of state water quality standards or adversely impacts a designated beneficial use. Surface-disturbing activities

(Appendix M) that contribute to offsite erosion and sediment delivery also are considered direct adverse impacts.

Long-term impacts to surface water quality are those that result from long-term (more than 5 years) bare ground or water disposal that increase sediment loads or degrade water quality.

Surface Water Quantity

Impacts to surface water quantity include those that reduce or supplement streamflows and may either be beneficial or adverse, depending on the quantity and the location of the withdrawal(s) and (or) discharge(s).

Direct impacts to surface water quantity result from activities, watershed conditions, or treatments (vegetative and physical treatments, impoundments, retention and detention structures, etc.) that increase or decrease the volume and quality of runoff or alter runoff timing. Direct impacts can be the result of adding or modifying water withdrawals from the drainage system. Indirect impacts to surface water quantity result from activities that modify the capacity of stream channels or result in changes to the amount of water reaching the stream system. For example, changes in the locations of roads that direct surface water runoff into drainages may change timing and amount of surface water flowing in a stream system. The distribution and conditions of wetlands and riparian areas influence surface water quality and quantity by affecting the capacitance and water storage of the watershed which, in turn, influences flow energies and erosive potential.

Groundwater Quality and Quantity

Direct impacts to groundwater quality and quantity could result from changes in the number of wells, including water supply, water disposal, oil and gas wells drilled, the condition and uses of existing wells, the number of springs developed, water conservation efforts, and the amount of surface water that infiltrates the ground before flowing to the surface water system. Indirect impacts to groundwater quality and quantity result from activities that modify the areas or sources that recharge the groundwater system. For example, activities that decrease vegetative cover or increase runoff would reduce the infiltration of precipitation and reduce groundwater recharge.

Long-term impacts to groundwater quality and quantity are those that result from permanent facilities or landscape alterations that modify groundwater recharge, including wells that deplete the aquifer through extraction, facilities that are paved to eliminate surface water infiltration, or wells that are used to inject water (disposal wells) into the groundwater system.

4.1.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Surface disturbance (Appendix M) can affect surface water quality mainly by increasing sediment delivery to drainages, which is ultimately transported to streams during runoff events. Surface disturbance in areas of highly erosive soils is an action more likely to increase sedimentation in streams than many others.
- The primary sources of surface disturbance from mineral development are roads and well pads for oil and gas development and the disturbance created by solid mineral mining.
- Livestock usually create less overall surface disturbance than mineral development, but the tendency for livestock to concentrate in riparian areas and in the proximity of open water while simultaneously impacting riparian vegetation may increase the extent of the influence for this type of disturbance.
- The Colorado River Basin (1st-level hydrologic unit code [HUC] 14) is projected to contain the greatest number of oil and gas wells in the planning area.

- The extent of unsurfaced roads (i.e., those without gravel or other added surface material) is an indicator of the relative quantity of sediment delivery that may impact surface water quality within each watershed (Furniss et al. 2000). New unsurfaced roads are likely to be constructed to access new oil and gas wells, so an increase in projected oil and gas wells is associated with an increase in roads.
- All other aspects being equal, the more susceptible a soil is to erosion the more likely it is to adversely impact surface water quality if disturbed. Erosive soils are difficult to protect through the implementation of standard BMPs. Due to the lack of soil surveys in the planning area, the locations of highly erodible soils have not been mapped and must be determined on an individual project basis. As described in the soils section, the Green River Basin Uplands soil group, located within the Colorado River Basin, contains the majority of erodible soils in the planning area and is the region projected to have the most oil and gas development and associated surface disturbance.
- Erosion contributes to sedimentation if it results in sediment delivery to the surface water drainage system. The amount of sedimentation is determined by many factors, including the amount of disturbed surface, the type of soil, the amount and timing of water sufficient to create overland flow, the proximity to established channels, the density and vigor of the vegetative community, and the effectiveness of erosion-control measures, such as BMPs. The buffering capacity of the land over which the water flows before reaching drainage also has a marked influence.
- Applications of limited volumes of appropriate quality water strictly for reclamation may be considered in specific cases under some alternatives. Most produced water in the planning area is saline and requires treatment prior to surface disposal. Additional pipelines or trips to transport produced water to centralized locations for deep-well injection or treatment and disposal at a few points may result from limits on surface disposal.
- Mineral development is the primary activity with a potential to impact shallow groundwater quality and quantity. The parts of the planning area with depths to groundwater of less than 100 feet are considered the most likely to be adversely affected by mineral development. The shallower the depth to water, the more sensitive an aquifer is to contamination (Wyoming Geographic Information Science Center 2003).

4.1.3.2 Analysis of Alternatives

The following analysis focuses on potential short-term and long-term impacts to surface water and groundwater quality and quantity projected because of allowable uses and management actions proposed under each alternative. The proposed management of the following resource programs have higher potential to affect (beneficially or adversely) water resources: cultural resources, fire and fuels management, fish and wildlife, special status species, forestry, INNS, minerals (including oil and gas), National Historic Trails (NHTs), OHV use, paleontology, rangeland and livestock grazing, recreation, soils, special designations and other management areas, transportation, and vegetation.

Impacts Common to All Alternatives

Based on the definitions, methods, and assumptions described above, the potential impacts of each alternative are described below. The following analysis of alternatives is organized according to the impacts of activities associated with each alternative. Impacts common to all alternatives are not repeated in the analysis of individual alternatives.

Surface Water Quality

Actions that remove vegetation and loosen the surface soil could cause soil erosion and sedimentation in the surface water system. Eroded soil that reaches surface water channels is a direct source of impaired

surface water quality. The amount of sediment delivered to a stream depends on many factors (e.g., slope length and gradient, vegetative cover and type, and density of the drainage network), all of which can result in deposition of the sediment before it reaches drainage (also called buffering).

Roads intercept surface water runoff on the landscape and often direct flows to drainages through ditches and culverts. If roads are unsurfaced, runoff flowing down a road often picks up sediment that is then deposited in the surface water system at stream crossings or at culverts and water bars. Alternatives that increase the density of roads in a watershed, especially unsurfaced roads, are anticipated to increase sedimentation. Roads also may act as conduits for directing contaminants from vehicles and resource management activities (e.g., pesticide applications) into the surface water system (Furniss et al. 2000).

Oil and gas development is the surface-disturbing activity with the greatest variation across the alternatives and is used as an indicator of potential impacts to surface water quality. The projected well numbers vary, but the proportion of total wells is similar across the alternatives, with the majority of all projected oil or gas wells located within the Colorado River Basin. Table 4-5 summarizes the projected oil and gas wells and constraints by alternative and river basin.

Table 4-5. Projected Oil and Gas Development and Constraints by River Basin Under Each Alternative

Alternative	Projections in the Kemmerer Planning Area	Colorado River Basin (14)	Bear River Basin (16)	Snake River Basin (17)	5th-level Watershed with Highest Acreage of Constraints
A	% of Projected Oil and Gas Wells	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	9%	5%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	23%	27%	6%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	67%	68%	94%	Greys River (1704010305)
B	% of Projected Oil and Gas Wells	96%	2%	2%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	27%	32%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	29%	19%	4%	Lower Hams Fork (1404010707)
	Moderate Constraints (% of River Basin with Constraints)	44%	48%	96%	Muddy Creek (1404010801)
C	% of Projected Oil and Gas Wells	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	9%	5%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	21%	24%	0%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	69%	71%	100%	Greys River (1704010305)
D *(Preferred Alternative)*	% of Projected Oil and Gas Wells	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	4%	13%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	19%	14%	4%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	77%	73%	96%	Little Muddy Creek (1404010802)

Under all alternatives, sedimentation within watersheds is minimized through implementing, inspecting, and maintaining BMPs and developing and implementing SWPPPs and erosion and sediment control plans, as required under the WYPDES Storm Water Program. Water management plans for surface disposals of produced water include reclamation strategies and mitigation, monitoring to track changes in receiving channels, and minimizing adverse impacts to watershed health. Monitoring rangeland condition is used to determine what grazing management actions are needed to minimize the amount of erosion that could affect surface water quality. WYPDES permits required by the State of Wyoming regulate water quality changes (BLM 2004g).

BLM water-monitoring activities are carried out primarily in support of specific management activities. This monitoring is used to measure the presence and magnitude of impacts (both beneficial and adverse), the effectiveness of mitigation measures, and as a mechanism to drive adaptive management. The Wyoming DEQ has an ongoing monitoring program (Wyoming DEQ 2004) designed to (1) determine the overall quality of the waters of the state, (2) determine the extent of water quality changes over time, (3) identify problem areas and areas in need of protection, and (4) determine the effectiveness of existing clean water programs.

Produced water is that water which is transported to the surface as a result of mineral activities. Most produced water in the planning area does not meet Wyoming DEQ standards for surface disposal (DiRienzo 2007). Avenues for disposal of untreated produced water include deep well injection or treatment and discharge. Disposal of produced water, that meets Wyoming DEQ standards for surface disposal, to stream channels on BLM managed lands will either be prohibited or tightly controlled (Appendix D) depending on the alternative.

Surface discharges of produced water from oil and gas wells are permitted by the Wyoming DEQ through a WYPDES permit that requires compliance with specific water quality standards to assure the produced water quality disposed on the surface is suitable for beneficial uses, such as agricultural and livestock, and does not result in a violation of water quality standards in the receiving stream. The Colorado River Salinity Control Act provided additional guidance with regard to the reduction of salt production within the Colorado River Basin. Adverse impacts to surface water quality from oil and gas are minimized under all alternatives by following standard practices, BMPs, and guidelines for surface-disturbing activities and surface disposal.

Surface Water Quantity

When watersheds lack sufficient vegetation (especially grasses, forbs, and residual litter), surface infiltration into the soil decreases, causing more runoff to reach the stream system. Conversely, activities, such as reclamation and proper grazing management, can improve vegetative cover and channel morphology, resulting in beneficial impacts. As surface disturbance increases, so does the amount of bare ground, compacted soils, and possibly less-pervious areas in a watershed. The greater the amount of surface disturbance, the greater the chances are that more surface water runoff reaches streams in a shorter period of time, which increases the potential for water quality degradation, sedimentation, and the frequency of flooding or erosive velocities from high flows in channels. Working toward and maintaining proper functioning condition as a minimum condition in riparian areas and complying with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) creates conditions that increase infiltration of surface water flows, filter out sediment before it reaches drainages, reduce runoff, improve vegetation, keep water on the land longer, and lower peak flows in the surface water system.

Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or surface disposal. Disposal of produced water to surface waters could affect surface water

quantity; however, currently there are no surface disposals of produced water to surface waters within the Kemmerer planning area (Roberts 2006).

Groundwater Quality and Quantity

Potential sources of groundwater contamination may come from point sources, such as chemical spills, chemical storage tanks (aboveground and underground), industrial sites, landfills, oil and gas well sites (including reserve pits), damaged and (or) aging well bores, oil and gas detention and retention ponds, and mining. The possibility of impacts to groundwater quality and quantity exists because of improper well casing and cementing techniques, dewatering coalmines, undetected or unreported spills, or leachate migration from trona settling ponds or produced water pits (BLM 1997a). Other possible sources of groundwater contamination may come from nonpoint sources, such as household septic tanks, roadways, and agricultural activities. Groundwater quality is most susceptible to pollution where the aquifer is shallow because there is less opportunity for filtering by the soil and bedrock.

Alternative A

Surface Water Quality

Over the long term, it is projected that BLM actions under Alternative A will disturb 144,673 acres (see Table 4-1). Under Alternative A, 95 percent of the projected oil and gas development will occur in the Colorado River Basin, which also contains the highest proportion of erodible soils, lands administratively unavailable for leasing, or major constraints. Associated with the concentrations of new oil and gas wells will be road and pipeline construction, which is likely to increase sediment delivery to the Colorado River. The constraints serve to minimize sediment delivery because of surface-disturbing activities in at least 30 percent of the Colorado River Basin.

Other proposed activities resulting in surface disturbance that could contribute sedimentation include the mining of coal, trona, salable, and locatable minerals; the development of wind-energy sites; construction of reservoirs, pits, or wells for wildlife and livestock use; and vegetation treatments. Limitations on construction of structures within the 100-year floodplain and the protection of wetlands and riparian areas will minimize impacts to perennial streams, but will not likely affect the current trends of wetlands and floodplains. Compliance with federal and state laws and regulations regarding the protection of floodplains, wetlands, and surface water quality will minimize adverse impacts through implementing standard BMPs and mitigation measures under normal conditions.

Surface Water Quantity

Alternative A contains relatively few constraints on activities that could result in soil compaction and vegetation removal, as indicated by the fact that more than 70 percent of the land has moderate or no constraints on oil and gas leasing. Therefore, it is anticipated that surface water flows would increase throughout the planning area, but especially in the Colorado River Basin, where most of the surface disturbance is projected. Supplemental flows associated with produced water are expected to be relatively minor and localized due to strict limitations on surface disposal on public land.

Groundwater Quality and Quantity

Alternative A has a high potential for soil compaction, vegetation disruption, and road construction, all of which will reduce the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Pitless technology for drilling operations most likely will not be prevalent, so the opportunity for contaminants to enter the groundwater will be the highest under this alternative, but low overall due to regulations by the Wyoming Oil and Gas Conservation Commission (WOGCC) and site-specific analyses done at the time of permitting.

Alternative B

Surface Water Quality

Alternative B projects the least long-term surface disturbance (47,693 acres) relative to other alternatives. Compared to Alternative A, there are fewer opportunities for surface-disturbing actions due to oil and gas development because fewer wells and associated roads are projected with a higher proportion of land that is administratively unavailable or contains major constraints. Areas within ¼ mile of water bodies and wetlands are designated as NSO for fluid minerals to protect these resources and those that depend on them. More actions are designed to minimize stream bank erosion. Damaged wetlands will be restored, resulting in improved trends over the long term. This protection also results in the fewest adverse impacts to water quality, especially in the Colorado River basin.

Surface Water Quantity

Alternative B will result in the least amount of change to surface water quantity due to the fewest projected number of oil and gas wells and the prohibition of surface disposals of produced waters on federally administered soil resources, which protects local streams. In addition, the prohibition would apply to federally produced water disposal on private surface.

Groundwater Quality and Quantity

Alternative B has the least potential for oil and gas development, soil compaction, and vegetation disturbance of any alternative. Requiring the lining of reserve pits and secondary containments on all facilities where oil or hazardous materials are stored or potential releases may occur, minimizes adverse impacts on groundwater quality from oil and gas operations. Alternative B also provides greater protection of floodplains where the groundwater is shallow and vulnerable to contamination, resulting in more protection for groundwater quality and quantity.

Alternative C

Surface Water Quality

This alternative has slightly smaller predicted short-term disturbance acreage than Alternative A, so it would be expected to have less surface water quality impacts. Relative to the other alternatives, surface water quality may sustain greater adverse impacts by increased sedimentation and other contaminants under Alternative C because it has fewer constraints on surface disturbance.

Surface Water Quantity

Alternative C impacts to surface water quantity are similar to those under Alternative A.

Groundwater Quality and Quantity

Overall, Alternative C impacts to groundwater quality and quantity are similar to those under Alternative A.

Alternative D (Preferred Alternative)

Surface Water Quality

The potential for adverse impacts to surface water quality through reduced soil stability and increased sedimentation and other contaminants in the surface water system under Alternative D are slightly less than that described under alternatives A and C, but greater than that for Alternative B. Surface-disturbing activities are designed to minimize stream bank erosion, fewer roads are likely to be constructed, and surface disturbance is limited on more steep areas than under Alternative A.

Surface Water Quantity

Alternative D has similar impacts to surface water quantity as Alternative A, but requires additional approval for surface water disposals.

Groundwater Quality and Quantity

Compared to other alternatives, Alternative D has the second lowest potential for short-term and long-term soil compaction and vegetation disruption, which reduces the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Potential adverse impacts to groundwater quality also are minimized through the lining of reserve pits and chemical contaminant areas, and are less than under alternatives A and C.

4.1.3.3 Conclusion

Differences in long-term surface disturbance acreage due to projected numbers of oil and gas wells and associated roads; variations in protection of floodplains, riparian areas, and wetlands; controls on lining of reserve pits and chemical contaminant areas; and produced water disposal form the basis for the following conclusion. Alternative B potentially will result in having the least adverse impacts to water resources because management actions under this alternative provide greater protections to surface water and groundwater quality and quantity. Alternative A would have the greatest impacts and fewest protections. Alternative C, with the second-most projected surface disturbance acres, but allowing fire suppression chemicals to be used near water, allowing building of permanent facilities in 100-year floodplains, could have more adverse impacts to surface water quality than Alternative A. The impacts under Alternative D, with less projected surface disturbance and increased protections to stream banks, floodplains, and groundwater, are similar to, but less than, the impacts from alternatives A and C. In ascending order from the least potentially adverse to the most potentially adverse impacts on water resources, the alternatives rank as follows: Alternative B, D, C, and A.

4.2 Mineral Resources

4.2.1 Locatable

Unlike leasable minerals (e.g., oil and gas or coal) or salable minerals (e.g., sand and gravel), in which issuance of a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is initiated by the mining claimant. The regulations as stated in 43 Code of Federal Regulations (CFR) 3809 manage surface-disturbing activities on mining claims. For exploration activities disturbing 5 acres or less, the claimant is required to submit a Notice of Intent (NOI) to the BLM. For exploration involving more than 5 acres and for actual mining operations—regardless of acreage—the claimant must submit a plan of operations (POO) for approval by the BLM before mining operations can begin. Different regulations apply to mining claims on lands in the National Forest System, National Park System, and the National Wildlife Refuge System; or on BLM-administered lands under wilderness review. If a mining claimant's operation is located on lands patented under the Stock Raising Homestead Act and no written surface owner consent exists, then a POO must be submitted for BLM approval. When the surface owner's consent has been obtained, the claimant does not need to submit an NOI or obtain POO approval.

Actions that could occur through implementing an alternative may affect access to locatable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires development activity to be conducted so that it is not readily apparent.

4.2.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Potential for locatable bentonite development activity is very low for the planning period.
- The potential for locatable uranium development activity is very low for the planning period.
- The potential development activity for locatable metallic minerals other than uranium is very low for the planning period. Although small deposits of metals in the planning area exist, no economically significant discoveries have occurred, and little activity is anticipated during the life of the RMP.
- The areal extent of fire clay was not mapped in a Geographic Information System (GIS) format and is included in this analysis in a general way only. Other than the two existing mines, the potential development activity for locatable fire clay is very low for the planning period.
- Current production and demand for building stone and moss rock is expected to continue.
- Other than limited hobby collection, the planning area has had no development of gemstones, and no production is expected during the planning period.
- The potential for occurrence of locatable minerals exists across the planning area, although not necessarily in commercial quantity or quality.
- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) will have some adverse impact on the potential mining of locatable minerals.
- Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP.
- The 43 CFR 3809 regulations manage surface-disturbing activities on mining claims.

- Building stone can be either locatable or salable. If not subject to the mining law, then it is considered salable.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact locatable mineral exploration and development activities include withdrawal from locatable mineral entry and restrictions to protect other resource values.

Impacts Common to All Alternatives

Restrictions (e.g., withdrawals) on locatable mineral exploration and development activities result in adverse impacts for all alternatives; however, the intensity of impacts is anticipated to vary by alternative. Therefore, adverse impacts to locatable minerals from specific actions are described under the individual alternatives. In general, the greater the acreage withdrawn from locatable mineral entry, the greater the adverse impact is to the resource. Most of the existing locatable mineral entry withdrawals are due to conflicts with other mineral resources, such as phosphate, coal, and oil shale. Surface-disturbing, timing, and surface-use restrictions may place additional limits on the ability of claimants to develop locatable minerals, but these are relatively minor adverse impacts compared to areas withdrawn from locatable mineral entry. However, in some cases, the cumulative effect of those restrictions could limit an operation to the point that it is uneconomic to proceed.

Alternative A

The 1986 Kemmerer RMP withdraws select federal mineral estate in the planning area from locatable mineral entry for the protection of oil shale, coal, and phosphate resources. These withdrawals adversely impact locatable minerals by limiting where exploration and development may occur. No additional restrictions on locatable mineral development exist under Alternative A.

Alternative B

A total of 940,220 acres are withdrawn from locatable mineral entry under Alternative B to protect resource values in the following areas:

- Developed campgrounds
- The federal section containing Bridger Antelope Trap
- Areas with special status plant and wildlife species
- Cokeville Meadows National Wildlife Refuge (NWR).

Some of the areas withdrawn from locatable mineral entry under Alternative B overlap with areas currently withdrawn, so the withdrawn acres in alternatives A and B are not additive. However, the additional acres withdrawn under Alternative B further reduce the area where exploration and development of locatable minerals may occur and, thus, result in a greater adverse impact compared to Alternative A.

Alternative C

Areas withdrawn from locatable mineral entry under Alternative C are the same as Alternative A; however, the BLM will initiate procedures to lift existing locatable mineral withdrawals under Alternative

C. In addition, no new mineral withdrawals will be considered under Alternative C, except for the Cokeville Meadows NWR. Although withdrawn acreage is the same as Alternative A, lifting existing locatable mineral withdrawals under Alternative C will increase the area available and, therefore, benefit exploration and development of locatable minerals compared to Alternative A.

Alternative D (Preferred Alternative)

In addition to the withdrawals identified in Alternative A, 4,572 additional acres are withdrawn under Alternative D to protect resource values in the following areas:

- Developed campgrounds
- The federal section containing Bridger Antelope Trap
- Areas with special status plant species
- Cokeville Meadows NWR.

Additional acres withdrawn under Alternative D reduce the area where exploration and development of locatable minerals may occur and, thus, result in a greater adverse impact compared to Alternative A, but less than for Alternative B.

4.2.1.3 Conclusion

Based on acres withdrawn from locatable mineral entry, Alternative B has the greatest adverse impact on locatable minerals development. Alternative C would lift some of the areas currently withdrawn from locatable mineral entry, thereby benefiting locatable minerals development. Most of the existing locatable mineral withdrawal is due to presence of other mineral resources, including coal, phosphate, and oil shale. Based on acreage withdrawn from locatable mineral entry under each alternative, the alternatives with the most to least adverse impact on locatable minerals development are alternatives B, D, A, and C.

4.2.2 Leasable – Oil and Gas

Management actions implemented to protect other resource values may directly and indirectly impact new oil and gas leases, exploration, and development. A direct impact is one that either specifically prohibits or permits oil and gas leasing, exploration, or development. An example of a direct impact is the administrative decision to identify areas as administratively unavailable for new oil and gas leasing. Management actions that do not explicitly permit or prohibit oil and gas exploration and development activity, but may influence a company's decision on whether to proceed with a given project, are considered indirect impacts. Indirect impacts are the result of management actions that may place or remove restrictions or additional requirements on oil and gas exploration and development. An example of an indirect impact is a CSU restriction preventing certain activities to protect a wildlife habitat area. Short-term impacts occur in less than 5 years. For example, a timing limitation stipulation (TLS) or other seasonal restrictions may result in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Administrative decisions to identify areas as administratively unavailable for oil and gas leasing result in long-term impacts if the decision exceeds 5 years. Refer to Maps 8 through 11 for leasable oil and gas alternatives.

4.2.2.1 Methods and Assumptions

The impact analysis used the following methods and assumptions:

- Analysis considered the baseline total unconstrained oil and gas development potential taken from the Reasonable Foreseeable Development (RFD) scenario for oil and gas (BLM 2006b) as summarized in Chapter 3 and applied the alternative constraints from the other resource programs as described in Chapter 2. Constraints will not affect existing leases; as old leases expire and new ones are issued, new leases would be subject to relevant restrictions.

- About 1,577,402 acres of federal mineral estate in the planning area have a moderate-to-high potential for the occurrence of oil and gas. Most of the planning area has a low development potential for oil and gas (BLM 2006b).
- Approximately 917,785 acres of federal mineral estate currently are leased and held by production in the planning area. Development of current leases under this RMP is subject to provisions in 43 CFR 3101.1-2.
- Where existing oil and gas leases occur, NSO restrictions for fluid minerals cannot be applied to the entire leasehold, as development must be allowed consistent with existing lease terms.
- The BLM can permit geophysical exploration activities in more restrictive visual resource management (VRM) areas because the operations are short-term activities.
- Geophysical permitting will be done on a case-by-case basis.
- Other federal agencies have included Fossil Butte, Cokeville Meadows, and Seedskadee National Wildlife Refuge in areas that are administratively unavailable for oil and gas leasing. However, the majority of Fossil Butte National Monument currently is leased, and a separate Land Use Plan provides guidance for future decisions regarding leasing.
- Areas administratively available for oil and gas leasing subject to major constraints have more adverse impacts on oil and gas leasing, exploration, and development compared to acres subject to either moderate constraints or standard stipulations. All areas identified as administratively available for oil and gas leasing are also referred to as "open" in this document and are subject to standard stipulations. In addition, some of these areas are subject to moderate and (or) major constraints.
- Moderate constraints are any stipulations which may restrict the timing or placement of an oil and gas development, but would not restrict the overall development. Moderate stipulations include all timing restrictions that by themselves or overlapping would not restrict the timing of development beyond 6 months, or would not require directional drilling techniques for more than ¼ mile (e.g., NSO for fluid minerals in specific sensitive plant populations, all wildlife restrictions where only one restriction occurs, restricts development on slopes greater than 25%).
- Major constraints are any stipulations which may restrict the timing or placement of oil and gas developments and may result in an operator dropping the development proposal. Major stipulations include timing restrictions that by themselves or overlapping would result in a timing restriction greater than 6 months or would require the use of directional drilling to reach targets over ¼ mile away (e.g., greater than ¼-mile NSO for fluid minerals, crucial big game overlapped with raptor buffers, prohibit developments over 10% slopes on erosive soils, etc.).
- The RFD scenario for oil and gas (BLM 2006b) based development potential on the anticipated drilling activity over the next 20 years, with most of the development occurring as infill wells in existing fields.
- Moderate and major constraints identified for each alternative (see Chapter 2) were applied to the unconstrained RFD scenario for oil and gas development to develop Maps 8 through 11 and the RFD scenario for oil and gas development for each alternative.

4.2.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under the regulations of 43 CFR 3150, the BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the

WOGCC is responsible for authorizing all operations on state and private surface. Geophysical operations which are entirely within a given lease may also be approved under 43 CFR 3160 regulations, via sundry notice (form 3160). The information gained from geophysical exploration reduces the number of dry holes drilled during the field development stage, resulting in less unnecessary surface impacts and fewer impacts to other resources.

Areas within the planning area are classified as either administratively unavailable for oil and gas leasing or administratively available for oil and gas leasing subject to standard stipulations and major and moderate constraints. The Raymond Mountain Wilderness Study Area (WSA) and the Mechanically Mineable Trona Area (MMTA) are administratively unavailable for oil and gas leasing under all alternatives. The area administratively available for oil and gas leasing subject to constraints varies by alternative.

Major constraints, such as NSO restrictions for fluid minerals and CSU restrictions, have the potential to adversely impact oil and gas exploration and development on new leases. For example, operators typically drill oil and gas wells vertically because the costs are lower and drilling problems are less likely. In some cases, an operator could place a drilling location, access road, or production facility in a less-sensitive area and drill the well directionally to recover reserves underlying the area with the surface-disturbance restriction. Directional drilling, however, is 1.25 to 4 times more costly than vertical drilling, and the increased costs could make some drilling ventures uneconomical. Operators can utilize directional drilling to tap oil and gas reserves on portions or margins of oil and gas leases in large contiguous areas subject to an NSO restriction for fluid minerals and employ this technology to develop isolated lease parcels subject to the same restriction. Since directional drilling has its horizontal limitations, operators could not develop all the oil and gas resources from all the acreage associated with large areas with an NSO restriction.

Impacts from moderate constraints, while adverse, are typically indirect and not as severe as those resulting from major restrictions. Moderate constraints may limit the timing of development activities or require specific mitigation, but they do not necessarily remove the acreage from development or require directional drilling. For example, under a TLS, development may become more intensive over a shorter timeframe to complete operations outside a TLS. In areas with overlapping TLS restrictions for wildlife, operators may be limited to when they can schedule development activities. In some cases, an operator may have to start development and then postpone operations during critical time periods. If the window during which work can be done is too short, a development project may have to be done in phases, requiring more time to complete, adding to the project's cost and prolonging the time before the investment is recovered. A company may decide not to develop the reserves if it considers the project marginal due to the additional requirements and added time and cost. Under BLM policy, however, lease stipulations and COAs are subject to exception, waiver, and modification. Air emissions from drilling and production activities are allowed up to applicable standards and guidelines, which represent an additional limiting factor for oil and gas development within the planning area.

In portions of the planning area, conflicts have occurred under all alternatives between oil and gas and trona, and may occur in the future between oil and gas and coal. Since 2004, the BLM has been working with industries, regulatory agencies, and other land owners to study and resolve technical and safety issues regarding recovery of overlapping oil and gas and trona resources. The conclusion from the deliberations is that oil and gas development and trona mining are basically incompatible because of the exposure of the underground trona workforce to risks associated with nearby high-pressure gas wells. The preferred course of action is to administer the area exclusively for trona extraction until conventional trona mining is complete. Therefore, an area has been designated, the MMTA, in which oil and gas leasing and development are currently prohibited. No formal decision has yet been made on the management of the oil and gas and trona resources within the MMTA boundary. This decision will be a part of the revision of the Kemmerer RMP.

NSO restrictions for fluid minerals for protecting 24 acres around bald eagle roosts are the same under all alternatives. This restriction occurs in areas with moderate oil and gas development potential and results in a relatively minor adverse impact to oil and gas. Under all alternatives, geophysical exploration will be allowed throughout the Kemmerer Field Office area on a case-by-case basis.

Alternative A

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative A identifies 104,817 acres, or 7 percent, of federal mineral estate in the planning area as administratively unavailable for oil and gas leasing (Tables 4-6 and 4-7). These acres of administratively unavailable BLM federal mineral estate are intended to protect resource values in the Raymond Mountain WSA and the MMTA; however, they also result in direct adverse impacts to oil and gas, as less land is available for leasing. Existing oil and gas leases are suspended in the MMTA under Alternative A.

Table 4-6. Acres of Federal Mineral Estate Administratively Unavailable and Available for Oil and Gas Leasing Subject to Constraints by Alternative in the Kemmerer Planning Area

Restriction	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Administratively Available with Standard Stipulations Percent (%) of Federal Mineral Estate	261,564 17%	13,796 <1%	265,414 17%	64,171 4%
Administratively Available with Moderate Constraints Percent (%) of Federal Mineral Estate	844,554 53%	103,704 7%	860,249 54%	1,042,502 66%
Administratively Available with Major Constraints Percent (%) of Federal Mineral Estate	368,427 23%	751,804 48%	348,882 22%	290,973 18%
Administratively Unavailable for Oil and Gas Leasing Percent (%) of Federal Mineral Estate	104,817 7%	710,058 45%	104,817 7%	181,716 12%

Note: Table includes mineral estate under other federal surface, as well as BLM, and includes areas exhibiting no, low, very low, moderate, and high development potential for oil and gas.
Source: BLM 2006a
< less than

Other Resource Restrictions. Under Alternative A, 1,474,545 acres are administratively available for oil and gas subject to standard stipulations (261,564 acres), moderate constraints (844,554 acres), and major constraints (368,427 acres) (Table 4-6). The relatively small NSO restrictions for fluid minerals associated with slopes greater than 40 percent, bald eagle winter roosting areas, raptor nests, a representative cushion plant community, four populations of *Physaria dornii* (special status plant species), Bridger Antelope Trap, a 400-foot buffer around developed campgrounds, and municipal airport runways are anticipated to have negligible adverse impacts on conventional oil and gas and CBNG development. Potential adverse impacts to exploration and oil and gas development from restrictions on timing of operations and (or) surface-disturbing activities are intended to protect resource values and, under Alternative A, are less than all other alternatives. Overall, the adverse impacts from resource restrictions under Alternative A are similar to Alternative C and less than alternatives D and B, respectively.

Table 4-7. Acres of Federal Mineral Estate Administratively Unavailable for Oil and Gas Leasing by Resource in the Kemmerer Planning Area

Resource	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Viewshed of High Management Level Trail Segments	0	542,520	0	0
MMTA Area	71,937	71,937	71,937	71,937
Bear River Divide MA	0	147,156	0	74,258
Raymond Mountain WSA	32,880	32,880	32,880	32,880
Rock Creek/Tunp	0	63,278	0	45,863

Note: Due to overlaps in some constraint areas, total acres in this table do not necessarily equal the totals for administratively unavailable acres in Table 4-6. Table includes mineral estate under other federal surface, as well as BLM, and includes areas exhibiting no, low, very low, moderate, and high development potential for oil and gas.
MMTA Mechanically Mineable Trona Area
MA Management Area
WSA Wilderness Study Area

Alternative A projects 223 federally permitted CBNG wells and 789 oil and gas wells will be drilled on federal mineral estate in the planning area between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 180 productive CBNG wells and 686 productive oil and gas wells, resulting in a 19 percent decrease in producing CBNG wells and a 16 percent decrease in other producing wells compared to the unconstrained baseline projection.

Alternative B

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative B identifies 710,058 acres (45%) of federal mineral estate in the planning area as administratively unavailable for new oil and gas leasing (Tables 4-6 and 4-7). These acres of administratively unavailable federal mineral estate are intended to protect resource values. Compared to all other alternatives, Alternative B identifies the most acreage as administratively unavailable for additional oil and gas leasing and is, therefore, anticipated to have the greatest direct and adverse impact on new oil and gas leasing in the planning area. In addition, Alternative B identifies the MMTA as administratively unavailable for oil and gas leasing until the oil and gas resource can be recovered without compromising the safety of underground miners.

Other Resource Restrictions. Under Alternative B, 869,304 acres are administratively available for oil and gas leasing subject to standard stipulations (13,796 acres), moderate constraints (103,704 acres), and major constraints (751,804 acres) (Table 4-6). Compared to all other alternatives, Alternative B subjects the most area to major constraints and the least area to standard and moderate constraints. Although these restrictions are anticipated to protect resource values, they also are anticipated to have the most adverse impacts on oil and gas development compared to all other alternatives. Restrictions are described in detail in Chapter 2 alternatives. Compared to Alternative A, additional NSO restrictions for fluid minerals under Alternative B include all populations of *Physaria dornii*, a ¼-mile buffer around developed campgrounds, and the Alfred Corum and Nancy Hill emigrant gravesites and Emigrant Spring/Dempsey cultural sites. For existing oil and gas leases, NSO restrictions cannot be applied to the entire leasehold; development must be allowed consistent with existing lease terms. The NSO restrictions for fluid minerals under Alternative B would be applied only to new leases in the areas identified.

Table 4-8. Projected BLM Federal Wells Drilled by Alternative through 2020 in the Kemmerer Planning Area

	Coalbed Natural Gas Wells	Oil and Gas Wells	Total Wells
Projected Wells Drilled (2001 – 2020)[1]			
Baseline – Wells Drilled (Unconstrained)	**274**	**947**	**1,221**
Alternative A – Wells Drilled Percent Reduction from Baseline	223 19%	789 16%	1,012 17%
Alternative B – Wells Drilled Percent Reduction from Baseline	113 59%	495 48%	608 50%
Alternative C – Wells Drilled Percent Reduction from Baseline	227 17%	793 16%	1,020 16%
Alternative D – Wells Drilled Percent Reduction from Baseline	226 18%	784 17%	1,010 17%
Projected Producing Wells (2001 – 2020)[1]			
Baseline – Producing Wells (Unconstrained)	**221**	**811**	**1,032**
Alternative A – Producing Wells Percent Reduction from Baseline	180 19%	686 16%	866 17%
Alternative B – Producing Wells Percent Reduction from Baseline	91 59%	429 48%	520 50%
Alternative C – Producing Wells Percent Reduction from Baseline	184 17%	680 16%	864 16%
Alternative D *(Preferred Alternative)* – Producing Wells Percent Reduction from Baseline	183 18%	675 17%	858 17%

Source: BLM 2006b

[1]Well counts include federal wells only and do not include existing wells.

BLM Bureau of Land Management

Additional restrictions on timing of oil and gas development and (or) surface-disturbing activities under Alternative B are intended to protect resource values, including sensitive and highly erodible soils; ¼-mile buffer around floodplains, wetlands, aquatic habitat, and riparian areas; known locations of special status plant species; fish-bearing streams; greater sage-grouse habitats; pygmy rabbit habitats; white-tailed prairie dog colonies or complexes; seven cultural sites; NHTs; Bridger Butte Area of Critical Environmental Concern (ACEC); Rock Creek/Tunp MA; Bear River Divide MA; and paleontological sites. The additional NSO for fluid minerals, timing, and surface-disturbance restrictions under Alternative B are expected to have the most adverse impacts on oil and gas development of all alternatives.

Alternative B projects 113 federally permitted CBNG wells and 495 other federal oil and gas wells will be drilled on federal mineral estate in the planning area between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 91 productive CBNG wells and 429 productive oil and gas wells, resulting in a 59 percent decrease in producing CBNG wells and a 48 percent decrease in other producing wells compared to the unconstrained baseline projection. Operators may have to drill many conventional federal wells directionally from existing well pads due to floodplain areas subject to an NSO restriction for fluid minerals, the 2-mile buffer zones around greater sage-grouse leks, and 1½ miles outside of raptor nest disturbance areas during specified seasons. Compared to all other alternatives, adverse impacts to oil and gas development are greatest under Alternative B.

Alternative C

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative C identifies the same amount of acres of federal mineral estate as administratively unavailable for oil and gas leasing as for Alternative A (Tables 4-6 and 4-7). Therefore, the impacts to oil and gas leasing from the administratively unavailable classification under Alternative C are anticipated to be the same as Alternative A. Alternative C will withhold the MMTA from new fluid mineral leasing and continue the suspension of existing oil and gas leases indefinitely. The withholding could be lifted if future technological innovation allowed for safe development of oil and gas leases. This action would benefit oil and gas development compared to Alternative A.

Other Resource Restrictions. Under Alternative C, 1,474,545 acres are administratively available for oil and gas subject to standard stipulations (265,414 acres), moderate constraints (860,249 acres), and major constraints (348,882 acres) (Table 4-6). Alternative C subjects similar size areas to major and moderate constraints and standard stipulations compared to Alternative A. The similar size area of restrictions is anticipated to result in similar adverse impacts on oil and gas development compared to Alternative A.

Compared to Alternative A, NSO restrictions on oil and gas activities under Alternative C are reduced by eliminating the NSO to protect the representative cushion plant community and four populations of *Physaria dornii*. Under Alternative C, restrictions on the timing of oil and gas activities and (or) surface-disturbing activities are similar to Alternative A. Exceptions include avoiding surface-disturbing activities in occupied pygmy rabbit habitats and additional protective buffer around NHTs under Alternative C. Compared to all other alternatives, Alternative C proposes the second lowest acreage with major constraints on oil and gas leasing. Under Alternative C, adverse impacts to oil and gas leasing from raptor nest and trails restrictions are more than under Alternative A, but less than Alternative B.

Alternative C projects 227 federal CBNG wells and 793 other federal oil and gas wells will be drilled on federal mineral estate between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates 184 productive CBNG wells and 680 productive oil and gas wells. Alternative C results in a 17-percent decrease in producing CBNG wells and a 16-percent decrease in other producing oil and gas wells from the unconstrained baseline projection. The number of producing wells projected under Alternative C is lower than the number projected under Alternative A, and slightly higher than Alternative D. The reduction in wells from the unconstrained baseline projection is mainly attributable to constraints associated with measures to protect raptor nests from disturbance.

Alternative D (Preferred Alternative)

Areas Administratively Unavailable for Oil and Gas Leasing. Under Alternative D, 181,716 acres (<1%) of federal mineral estate are administratively unavailable for oil and gas leasing to protect resource values (Tables 4-6 and 4-7). Alternative D identifies more acreage as administratively unavailable for oil and gas leasing compared to Alternative A. Alternative D restrictions and associated impacts are the same as Alternative C for oil and gas leasing in the MMTA.

Other Resource Restrictions. Compared to Alternative A, changes in NSO restrictions for fluid minerals under Alternative D include removing the NSO for four populations of *Physaria dornii*, increasing the Bridger Antelope Trap area subject to NSO restrictions to 640 acres, adding an NSO restriction to seven cultural sites, and expanding the NSO buffer area around developed campgrounds to ¼ mile. Overall, the NSO restrictions for fluid minerals under Alternative D are expected to increase resource protection and increase adverse impacts to oil and gas leasing compared to Alternative A. Under Alternative D, restrictions on the timing of oil and gas activities and (or) surface-disturbing activities generally are increased compared to Alternative A. Increased restrictions under Alternative D are intended to protect resource values, including sensitive soils, fish-bearing streams, 160 additional acres of the Bridger Antelope Trap, and expanding the buffer around low, medium, and high management level

NHT segments; Bridger Butte ACEC; Rock Creek/Tunp MA; and Bear River Divide MA. While these timing and surface-disturbing restrictions do not prohibit drilling, operators may have to directionally drill or reschedule drilling to develop the resources, making some ventures unfeasible or uneconomical.

Alternative D projects 226 federal CBNG wells and 784 other federal oil and gas wells will be drilled on federal mineral estate between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 183 productive CBNG wells and 675 productive oil and gas wells (an 18% decrease in the number of CBNG-producing wells and a 17% decrease in the number of producing conventional oil and gas wells from the unconstrained baseline projection). The number of wells projected under Alternative D is slightly lower compared to Alternative C.

4.2.2.3 Conclusion

Acres administratively unavailable for oil and gas leasing are lowest under alternatives A and C and highest under Alternative B. The area of potential new leases subject to NSO restrictions for fluid minerals, timing, and (or) surface-disturbance restrictions is also lowest under alternatives A and C and highest under Alternative B. The number of producing wells expected is highest under alternatives A, C, and D and lowest under Alternative B. Overall, Alternative A will result in the least potential adverse impacts, followed by alternatives C and D. Conversely, Alternative B will result in the most adverse impacts to new oil and gas leasing, exploration, and development.

4.2.3 Leasable – Coal

Prior to offering federal coal reserves for lease, a screening process, as outlined in 43 CFR 3420.1-4, must be completed. The process includes four screens: coal development potential, unsuitability criteria, multiple-use conflicts, and surface-owner consultation. The area may be offered for lease only after the screening process is completed and the area is determined to be acceptable for further consideration for coal leasing and development. In the Kemmerer planning area, the Haystack Lease By Application is the only one that has recently gone through the coal-screening process. The lease application is addressed in the alternatives (Chapter 2).

Coal leases that were issued prior to the effective date of the Surface Mining Control & Reclamation Act of 1977 are not subject to the coal-screening process. Environmental protection of resource values affected by coal mining are addressed through the mine plan approved by the Secretary and permitting approved by the Wyoming DEQ fulfilling its cooperative agreement responsibilities for the Federal Office of Surface Mining. All the existing coal leases in the Kemmerer Field Office are in that category.

Once the coal reserves are leased, oversight of surface coal mining operations and reclamation in conformance with the approved permit passes to the Office of Surface Mining and the Wyoming DEQ, Land Quality Division. Resource recovery and protection plan approval, minor mining plan approvals, and verifying production tonnage and determining maximum economic recovery remain the responsibility of the BLM. The initial and major mining plan modification approval is the responsibility of the Assistant Secretary for Lands and Minerals and the necessary document (the resource recovery and protection plan) is forwarded to the Assistant Secretary for Lands and Minerals by the Office of Surface Mining along with a copy of the permit.

Actions that could occur through implementing each alternative could affect coal resources. This section describes the impacts of each alternative on coal leasing, exploration, and development and in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse. Direct impacts are the result of actions that either specifically prohibit or permit coal leasing, exploration, or development. An example of a direct impact is the closure of an area to coal leasing to protect another resource. Indirect impacts are the result of actions that may place or remove restrictions or additional requirements on mineral exploration and development. An example of an indirect impact is a viewshed restriction on development activity that, while not preventing development, requires development activity be conducted so that it is not readily apparent. Short-term impacts are

those impacts that occur in less than 5 years. A timing or seasonal restriction results in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Closures to coal leasing result in long-term impacts.

4.2.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Coal occurs in various portions of the planning area and development potential is high on certain federal coal leases. As of 2003, approximately 3,963 acres are included in the Haystack Lease By Application being considered as part of the alternatives.
- No additional areas other than the Haystack Lease By Application area are being evaluated as acceptable for further consideration for coal leasing and development.
- While all BLM-administered lands may be considered open outside the Raymond Mountain WSA for coal exploration, new exploration on unleased lands outside the Haystack area is unlikely during the planning period.
- Coal exploration involves the use of truck-mounted drill rigs and support vehicles to drill shallow core holes. The P&M Kemmerer Mine has the only active exploration on leased federal coal.
- Restrictions on coal exploration include high coal-occurrence potential areas where no surface-disturbing activities are allowed or overlapping areas of timing restrictions result in year-round restrictions.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.3.2 Analysis of Alternatives

The primary decision affecting coal leasing is determined by the screening process (see 43 CFR 3420.1-4) as areas acceptable for further leasing consideration. In addition, allowable uses and management actions with the potential to impact coal exploration and development include restrictions to protect other resource values. As coal exploration and development are affected by the alternatives, coal exploration and development can, in turn, impact other resources. For example, roads built to accommodate development could contribute to habitat fragmentation. The impacts of coal development on other resource topics (e.g., physical, biological, fire and fuels management, etc.) are discussed under their respective impacted resource sections.

Impacts Common to All Alternatives

Approximately six sections of land (3,963 acres) were reviewed to determine their suitability for coal leasing in accordance with the screening process described in 43 CFR 3420.1-4 (BLM 2004b). All six sections of land were determined acceptable for further consideration for coal leasing subject to conditional requirements or mitigation measures; however, this is treated differently under each alternative. The Haystack Coal Lease By Application and existing coal leases within the planning area are shown on Map 12.

Coal exploration on unleased federal mineral estate is subject to the requirements and conditions of the coal-exploration license process, which requires project-specific stipulations and conditions designed to limit impacts from exploration on other resources.

Alternative A

Coal Exploration and Development Impacts

Direct adverse impacts to coal exploration and development may occur from restrictions on surface disturbance or surface-disturbing activities to protect resource values in Bridger Antelope Trap. Approximately 521 acres of Bridger Antelope Trap overlay areas of moderate-to-high potential coal occurrence.

Coal Leasing Impacts

Under Alternative A, any Lease By Application for new coal leases will be processed for areas outside the Raymond Mountain WSA and Raymond Mountain ACEC by applying the coal screening process to the application. At this time, only the Haystack Lease By Application has been received by the BLM.

Alternative B

Coal Exploration and Development Impacts

A GIS analysis identified restrictions on areas that could adversely impact coal exploration or development by not allowing surface-disturbing activities and (or) restricting timing of activities on areas of moderate-to-high coal occurrence potential. Were the RMP amended and new coal leasing considered, adverse impacts to coal exploration and development from restrictions to protect resource values would be greater under Alternative B than under any other alternative.

Coal Leasing Impacts

Under Alternative B, no new coal leasing will be considered in the planning area. This management action results in the greatest direct, adverse impact to coal leasing compared to all alternatives.

Alternative C

Coal Exploration and Development Impacts

Other resource restrictions on coal exploration and development under Alternative C are the same as Alternative A. Restrictions have the potential to adversely impact coal exploration or development because surface disturbance or the timing of operations is restricted. Impacts to coal exploration from restrictions under Alternative C are similar to Alternative A and less than those for alternatives B and D.

Coal Leasing Impacts

Impacts to coal leasing under Alternative C are the same as those identified under Alternative A, except federal land within the proposed Haystack Lease By Application project is determined to be acceptable for further consideration for coal leasing and development.

Alternative D (Preferred Alternative)

Coal Exploration and Development Impacts

Under Alternative D, additional restrictions on coal exploration and development in moderate-to-high coal occurrence areas compared to Alternative A include the following:

- Bear River Divide MA (17,734 acres)
- Raymond Mountain ACEC (483 acres)
- Rock Creek/Tunp MA (5,607 acres)
- Bald eagle roost buffer areas (seasonal restriction on 1,138 acres)
- Cultural sites (including Bridger Antelope Trap, 640 acres)
- Special status plant species (6 acres)

These restrictions could adversely impact coal exploration or development by restricting surface-disturbing activities and (or) the timing of operations. Adverse impacts to coal exploration and development under Alternative D are similar in nature, but slightly larger in acreage, compared to Alternative A. Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

Coal Leasing Impacts

Under Alternative D, BLM-administered lands outside of the Raymond Mountain WSA will be open for new Lease By Application submissions. These areas would then be subject to the coal screening process. The proposed Haystack Lease By Application area is determined acceptable for further consideration for coal leasing and development (see *Coal Screening Summary Report* [BLM 2004b]). Under Alternative D, restrictions from other resources could impact coal leasing during the reapplication of coal screens.

4.2.3.3 Conclusion

Alternatives A, C, and D have the least potential adverse impacts on coal leasing, exploration, and development because they all allow Lease By Application within the planning area. Alternative B does not allow new coal leasing in the planning area and, therefore, has the greatest impact to coal leasing, exploration, and development activities.

4.2.4 Leasable – Sodium (Trona)

Actions occurring through implementing an alternative could affect new leasing and (or) access to sodium for exploration activities. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Potential for sodium exploration and development activity is high for the planning period (see Map 13).
- Any alternative that limits sodium mineral development (i.e., reduces the area available for development) will have some adverse impact.
- Exploration activities could include core drilling to evaluate a deposit's potential.
- Surface restrictions could affect exploratory or tailings injection drilling operations, and placement of permanent surface facilities such as road and mine shafts. Surface restrictions do not affect the actual mining of trona since all mining, either conventional or solution mining, is underground.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.4.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact sodium mineral development include management actions that result in areas closed to leasing, conflicts with other mineral development including oil and gas, and, to a limited degree, areas of surface use and timing restrictions.

Impacts Common to All Alternatives

The intensity of impacts to sodium leasing and development is anticipated to vary by alternative. Restrictions to timing and surface use may limit activities associated with exploration and development, but these types of restrictions are not expected to prohibit sodium development, since operations typically occur underground. Within the MMTA, the potential for sodium exploration and development is high, while outside that area the potential for exploration, development, and new leasing is low.

Alternative A

Federal mineral estate outside of the Raymond Mountain WSA is available for sodium leasing consideration and exploration is considered on a case-by-case basis. Restrictions to protect special status plant and wildlife species and cultural resources could adversely impact development of sodium on federal mineral estate if a biological survey finds such species present in the proposed development. These restrictions would only affect placement of above-ground facilities associated with trona development.

Alternative B

Surface-disturbing restrictions in floodplains could impact sodium development on 33,658 acres of federal mineral estate exhibiting moderate-to-high potential occurrence of sodium. No new permanent facilities will be allowed in floodplains, riparian areas, or wetlands to support sodium mineral development activity under Alternative B. Seasonal restrictions on surface-disturbing and disruptive activities to protect greater sage-grouse habitats will directly and adversely impact about 1,323 acres of federal mineral estate with moderate-to-high potential occurrence of sodium. These restrictions do not prohibit sodium development, but may affect timing of activities and placement of above-ground facilities to protect resource values.

Surface-disturbing restrictions to protect prairie dog habitats will directly and adversely impact 1,371 acres of moderate-to-high potential occurrence of leasable sodium federal mineral estate. Special status plant and wildlife species could directly impact development of existing sodium leases on federal mineral estate (e.g., placement of above-ground facilities) if a biological survey finds such species present in the proposed development. Alternative B closes areas with special status plant and wildlife species to sodium mineral development, most of which are located in areas exhibiting low potential occurrence of sodium.

Alternative C

Alternative C is the same as Alternative A. Impacts to sodium development under Alternative C are anticipated to be the same as Alternative A.

Alternative D (Preferred Alternative)

Alternative D is the same as Alternative A, except Alternative D does not close areas of special status plant or wildlife species to sodium mineral development, which would affect placement of above-ground facilities. Impacts to sodium mineral development are anticipated to be similar to Alternative A.

4.2.4.3 Conclusion

Based on closure of areas with special status plant and wildlife species to sodium development, Alternative B has the greatest impact to sodium development compared to all alternatives. Surface restrictions to protect floodplains and other resource values also are highest under Alternative B. Alternatives C and D are similar to Alternative A, with the least restrictions on sodium leasing and development and the least potential impacts.

4.2.5 Leasable – Other Solid Leasables

Actions that could occur through implementing an alternative may affect access to other solid leasable minerals, especially oil shale and phosphate, for exploration and development activities. Other types of

actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires development activity be conducted so that it is not readily apparent.

4.2.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for phosphate exploration and development activity is low for the planning period. Currently, no federal phosphate leases or development activity in the planning area is occurring.
- The potential for oil shale exploration and development activity is low for the planning period due to availability of higher quality oil shales in regions outside the planning area.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).
- Any alternative that limits other solid leasable mineral development (i.e., reduces the area available for development) in areas of moderate-to-high potential occurrence will have some adverse impact.
- Exploration activities could include core drilling or trenching to evaluate a deposit's potential.

4.2.5.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact other solid leasable mineral development include limits on leasing and surface-disturbing, timing, and surface-use restrictions. Oil shale is not considered in the alternatives due to the Programmatic EIS and Plan Amendments for Oil Shale and Tar Sands Resources Leasing on Lands Administered by the BLM in Colorado, Utah, and Wyoming currently being prepared by the BLM. To implement the decisions resulting from this Programmatic EIS, as well as the final regulations, the BLM has determined that it will be necessary to amend this RMP in areas where oil shale resources are present. Maps 14 through 16 show other solid leasable minerals, sodium, and phosphate for alternatives A through D.

Impacts Common to All Alternatives

Adverse impacts to other solid leasables could result when leasing or exploration are prohibited or when surface-disturbing restrictions apply to exploration and development activities. The intensity of impacts to other solid leasables is anticipated to vary by alternative. The greater the acreage closed or subject to surface-disturbing restrictions, the greater the adverse impact. Restrictions to timing and surface use may put some limits on activities associated with exploration and development, but these types of restrictions are not expected to prohibit activity. Oil shale leasing will not be considered in areas where it would jeopardize the safe operation of existing trona mines. Timing restrictions for bald eagle roosts will limit exploration and development activity of phosphates for more than 6 months of the year on 883 acres of federal mineral estate with moderate-to-high phosphate occurrence potential for all alternatives. In addition, the Raymond Mountain WSA is not available for phosphate leasing under all alternatives.

Alternative A

Federal mineral estate outside of the Raymond Mountain WSA is available for consideration for leasing of phosphate and other solid leasables on a case-by-case basis. Restrictions to protect special status plant and wildlife species and cultural resources could adversely impact development of phosphate and other

solid leasables on federal mineral estate if a biological survey finds such species present in the proposed development.

Alternative B

Alternative B does not allow new phosphate exploration or leasing within the viewshed of the Fossil Butte National Monument or incorporated towns and cities (Map 15). Under Alternative B, the Bear River Divide MA and Rock Creek/Tunp MA are administratively unavailable for solid leasable minerals and areas with special status plant and wildlife species are closed to phosphate development. Additional detail regarding restrictions associated with the Bear River Divide MA and Rock Creek/Tunp MA are described in the Special Designations section. Based on size of the area not available for leasing and size of the area subject to surface-disturbing restrictions, Alternative B has the greatest potential for adverse impact to the development of phosphate resources of all the alternatives.

Alternative C

Alternative C management actions for other solid leasables are the same as Alternative A and, therefore, are expected to have similar adverse and beneficial impacts to the development of phosphate resources (Map 14).

Alternative D (Preferred Alternative)

Alternative D management actions for other solid leasables are the same as Alternative A and, therefore, are expected to have similar adverse and beneficial impacts to the development of phosphate resources (Map 16). However, restrictions on leasing and surface-disturbing activities associated with the Bear River Divide MA and Rock Creek/Tunp MA are expected to adversely impact leasing and development of phosphate more under Alternative D compared to Alternative A. Additional detail regarding restrictions associated with the Bear River Divide MA and Rock Creek/Tunp MA are described in the Special Designations section.

4.2.5.3 Conclusion

Management actions to protect resource values may impact the acreage open to leasing, exploration, and development of other solid leasables and (or) limit how these activities can be conducted. The potential occurrence of moderate-to-high phosphate federal mineral estate is impacted by closures or surface-disturbing restrictions under all alternatives, but the restricted area is largest under Alternative B. Alternative B restrictions on phosphate development activity are intended to protect floodplains, ACECs, the Rock Creek/Tunp MA, and the Fossil Basin viewshed, along with other sensitive areas. Alternative D has fewer restrictions on other solid leasables than Alternative B and, therefore, less impact. Alternatives A and C have the fewest restrictions and the least impact on other solid leasables.

4.2.6 Salable

Actions that could occur through implementing an alternative may affect access to salable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for occurrence of mineral materials exists across the planning area.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both

exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

- The potential for salable limestone development activity is very low for the planning period. Substantial commercial limestone production in the planning area is not expected.
- Additional common variety materials, such as sand, gravel, decorative stone, clay (e.g., shale), borrow material, and clinker (scoria), occur within the planning area, but their aerial extents are not mapped in GIS format. Some varieties (e.g., aggregate sand and gravel, borrow material) have a high potential for development. Current production and demand for building stone and moss rock is expected to continue.
- Any alternative that limits mineral material development (i.e., reduces the area available for development) will have some adverse impact.
- Exploration activities could include core drilling or trenching to evaluate a deposit.
- Building stone can be either locatable or salable. If it is a common variety and not subject to the mining law, then it is salable.
- Area closures and surface and timing restrictions could result in adverse impacts by reducing access to common variety materials.

4.2.6.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact salable mineral development include management actions resulting in areas closed to mineral material disposal, surface-disturbing restrictions that effectively close areas to mineral material disposal, and timing and surface use restrictions.

Impacts Common to All Alternatives

Restrictions on salable mineral development could result in substantial adverse impacts to exploration and development activities when closures and surface-disturbing restrictions apply. The intensity of impacts is anticipated to vary by alternative. The greater the acreage closed or not allowing surface-disturbing activities, the greater the adverse impact to this resource. Therefore, impacts from closures and surface-disturbing restrictions are described under the individual alternatives. Restrictions linked to timing and surface use may add additional limits (mainly by increasing costs) on the ability of industry to develop these types of high-volume cost-sensitive types of resources.

Alternative A

No closure to mineral material disposal or surface-disturbing restrictions apply to federal mineral estate with potential salable resources under this alternative. Mineral material sales and (or) free use permits will be authorized in areas with special status plant and wildlife species on a case-by-case basis.

Alternative B

New mineral material sales and free use permits will not be issued on approximately 970,953 acres of federal mineral estate under Alternative B, the largest restriction of any alternative (see Map 17). Areas of federal mineral estate that will not be available for mineral material sales or free use permits, which could effectively close those areas to mineral material disposal, include the Raymond Mountain WSA (32,880 acres), a buffer of a ½-mile radius of developed campgrounds (726 acres), the viewshed of Fossil Butte National Monument (250,146 acres), and in areas containing special status plant and wildlife species (refer to Map 17). No mineral material disposals and surface-disturbing and overlapping timing restrictions could result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section. To protect resource values, Alternative B

prohibits new mineral material disposals on the largest area, thereby causing the greatest adverse impacts on salable minerals compared to all alternatives.

Alternative C

Alternative C management actions for salable minerals are the same as Alternative A. Impacts to salable minerals are, therefore, anticipated to be similar compared to Alternative A.

Alternative D (Preferred Alternative)

New mineral material disposals will not be issued on approximately 34,374 acres of federal mineral estate under Alternative D, more than Alternative, A but less than Alternative B (see Map 18). These include no mineral material sales and (or) free use permits authorized within the Raymond Mountain WSA or within ½ mile of developed campgrounds; however, if impacts to campground users are minimized, salable minerals could be developed. Alternative D also restricts mineral material disposals in actual special status plant species locations. Due to the greater area, restrictions on mineral material disposals under Alternative D may adversely impact (by reducing access) development of salable minerals more compared to Alternative A.

4.2.6.3 Conclusion

Management actions may adversely impact the acreage available for mineral material sales and (or) free use permits. In addition, management actions may restrict how and when exploration and development activities can be conducted. Based on the acreage prohibiting new mineral material sales and (or) free use permits, and restrictions identified to protect resource values, Alternative B will have the greatest adverse impact to salable minerals, followed by Alternative D. Due to the general lack of restrictions, impacts to mineral material sales and free use permits are similar and the least adverse for salable mineral development under alternatives A and C.

With respect to the additional common variety materials listed in the Methods and Assumptions section, it should be noted that the location of these potential areas are not mapped for this analysis. Therefore, predicting potential adverse impacts due to restrictions identified under each alternative are presented in a general way only.

4.3 Fire and Fuels Management

The impacts of alternatives on fire and fuels management are anticipated to affect the planning, management, implementation, and cost of fire management. Restrictions on fire and fuels management are considered direct impacts. Indirect impacts from alternatives include actions resulting in a change in risk or incidence of wildland fires; size, intensity, or destructive nature of wildland fires; fire-suppression costs; and fuel loading.

Fire plays an important and natural part in ecosystem function; however, the natural fire regime largely has been suppressed in the planning area. Although the suppression of the natural fire regime is considered an adverse impact to fire ecology, actions contributing to an increase in the incidence of wildland fires or limiting the ability to effectively fight wildland fires are considered adverse impacts to fire management. This analysis focuses on impacts to fire management. For example, actions limiting fire-suppression tactics, thereby resulting in larger burn areas or more intense fires, are considered adverse impacts. Conversely, actions contributing to a decrease in the incidence of resource-damaging wildland fires or enhancing the ability to fight fires are considered beneficial impacts. For example, the use of unlimited tactics or full suppression may, in some cases, protect a resource against potential fire damage, a beneficial impact. Regarding planned or prescribed fire, actions restricting the acreage or effectiveness of prescribed fire are considered adverse. For example, stipulations to protect other resources (e.g., wildlife or livestock grazing) restricting or preventing prescribed fires from being conducted in certain areas or at certain times of the year are considered direct adverse impacts to prescribed fire management. Conversely, the lack of stipulations or actions increasing the acreage or effectiveness of prescribed fire are considered a beneficial impact.

For the purpose of this analysis, short-term impacts to fire and fuels management include impacts occurring within 5 years. Long-term impacts are those remaining or occurring after 5 years. Impacts to fire and fuels management from alternatives are anticipated to be short-and long-term.

The following description of impacts is organized according to three sections: unplanned/wildland fire, planned/prescribed fire, and stabilization and rehabilitation following fire. The methods and assumptions and analysis of alternatives sections are described only under the first section, Unplanned/Wildland Fire, but apply to all three sections. Refer to Map 20 for Fire and Fuels Management.

4.3.1 Unplanned/Wildland Fire

4.3.1.1 Methods and Assumptions

Alternatives are evaluated based on a regional context of high fuel loadings and current management issues for all resource programs, as described in Chapter 3.

Methods and assumptions used in this impact analysis include the following:

- Wildland fire in Wildland Urban Interface (WUI) areas typically will be suppressed.
- Under all alternatives, threatened and endangered species consultation and coordination will be conducted, where applicable, regardless of alternative.
- Wildland fire use and (or) an Appropriate Management Response (AMR) will be used in areas where wildland fires do not pose a threat to human life, private properties, or important resources and could be used as a tool to reduce fuel loads and improve plant communities and certain desirable wildlife habitats.
- The *Fire Management Plan Southwestern Zone Wyoming BLM 2004* will implement the fire management direction on BLM land within the planning area (BLM 2004f).

- Air quality currently is not affecting the ability to conduct prescribed burns; however, the more stringent air quality standards are, the more likely it is that they will affect that ability in the long term, with development occurring elsewhere in the region.
- Where livestock grazing occurs, it is BLM policy that areas burned must be rested from grazing for a minimum of two consecutive growing seasons after the fire is extinguished.
- The BLM Emergency Stabilization and Rehabilitation standards located in the *Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook* (USDI 2005c) could be implemented on wildland fires to protect and sustain healthy ecosystems and protect life and property.
- The BLM will cooperate with the State of Wyoming Abandoned Mine Land Division to control fires in coalbeds.

4.3.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact fire and fuels management generally can be characterized as either restrictions or proactive management actions associated with each alternative. The following analysis of alternatives describes potential impacts from alternatives according to three sections: wildland fire, prescribed fire, and stabilization and rehabilitation.

As fire and fuels management is affected by the alternatives, fire and fuels management can, in turn, impact other resources, including resource protection. For example, fires burning greater acreage for longer periods will emit more particulate matter into the air, thereby affecting air quality. In addition, fire can affect rangeland health, wildlife habitat quality and quantity, and plant community health. The impacts of fire and fuels management on other resource topics (e.g., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types and context of impacts anticipated for wildland fire because of the various alternatives are similar. Impacts to wildland fire from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Management actions regarding fire suppression are currently guided by decisions in the existing plan (BLM 1986a) and the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). Wildland fire suppression follows AMR. Under Alternative A, fire suppression is driven by property threatened or resource benefits derived. Full suppression is used where it is clearly warranted due to potential resource damage, threats to persons or property, or adverse weather conditions or forecast (BLM 1986a).

Restrictions. Alternatives restricting fire suppression, fuels management, or wildland fire planning are anticipated to adversely impact wildland fire management. For example, except to protect human life, Alternative A does not allow use of fire-suppression chemicals in special status plant species populations or within 200 feet of water sources. Soil disturbance from use of heavy equipment is allowed during fire suppression in the planning areas; however, soil disturbance is limited to protect cultural and natural resources. These restrictions under Alternative A limit, and therefore adversely impact, fire suppression and fire management.

Proactive Management Actions. Alternative A allows wildland fire use to meet fire and fuels resource management objectives and to reduce hazardous fuels, which are beneficial impacts to this resource. Suppression of wildland fire follows AMR in areas where fire is not desired or where fire can be used as a management tool. Prescribed fire and wildland fire use can be used to reintroduce fire in its natural role in the ecosystem, a beneficial impact to this resource.

Alternative A manages wildland fire in accordance with a limited number of restrictions and specific proactive management actions. The restrictions in Alternative A are anticipated to have short- and long-term adverse impacts to wildland fire management. For example, use of wildland fire to reduce hazardous fuel loads will facilitate fire containment and suppression. Conversely, restrictions on suppression activities could maintain or increase hazardous fuel loads.

Alternative B

Restrictions. Although Alternative B continues to use AMR strategies in areas where fire is not desired or where fire can be used as a management tool, the increase in restrictions on suppression activities adversely impacts fire management to a greater extent compared to Alternative A. For example, Alternative B does not allow soil disturbance during suppression activities without consent of the authorized officer, thereby adversely impacting fire suppression more than Alternative A. In addition, Alternative B enlarges the restrictions on the use of fire-suppression chemicals in areas of special status plant species populations to ¼ mile and to 500 feet from surface water sources.

Proactive Management Actions. Similar to Alternative A, Alternative B allows wildland fire use to meet fire and fuels resource management objectives; however, these management objectives are based on the thresholds and areas identified in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), thereby benefiting fire management in the planning area. In addition, allowance of wildland fire to meet vegetation objectives throughout the planning area and to simulate natural alteration of vegetation to meet wilderness and healthy forest objectives in the Raymond Mountain WSA, are anticipated to benefit the fire management program more compared to Alternative A.

Although fire suppression under Alternative B is more restrictive compared to Alternative A, Alternative B's proactive management actions for using wildland fire to achieve management objectives are anticipated to result in beneficial impacts to wildland fire management throughout the planning area. The combination of more restrictions and beneficial actions for Alternative B are anticipated to have more overall benefits to wildland fire management relative to Alternative A.

Alternative C

Restrictions. Alternative C has fewer fire-suppression and heavy-equipment restrictions than Alternative A, potentially benefiting fire management through increased management flexibility. For example, Alternative C does not allow soil disturbance throughout the planning area unless private or public habitable structures or industrial facilities are at risk. However, Alternative C also requires suppression of all wildland fires in the planning area, thereby restricting the BLM's ability to meet objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) and increasing hazardous fuel loads in the planning area.

Proactive Management Actions. Under Alternative C, use of fire-suppression chemicals is allowed throughout the planning area (including near surface water sources), except in special status plant species populations. The flexibility to use fire-suppression chemicals throughout the planning area is anticipated to benefit fire management more than in Alternative A.

Unlike alternatives A and B, Alternative C does not use wildland fire, chemical, mechanical, or biological treatments to meet fire and fuels objectives, thereby adversely limiting fire management flexibility and potentially increasing hazardous fuel loads in the planning area. In addition, Alternative C does not allow wildland fire use to reintroduce fire to its natural role in the ecosystem. Use of wildland fire in the Raymond Mountain WSA is similar to Alternative B.

Suppression of all wildland fires and not considering fire to reduce hazardous fuel loads and reintroduce fire to its natural role in the ecosystem does not allow the BLM to meet the fire and fuels management objectives in the *Fire Management Plan* Southwestern *Zone Wyoming BLM 2004* (BLM 2004f). The combination of restrictions and proactive management actions of Alternative C are anticipated to have

less overall benefits to wildland fire management relative to Alternative A, potentially resulting in the greatest adverse impacts to fire management of all alternatives.

Alternative D (Preferred Alternative)

Restrictions. Similar to Alternative A, Alternative D restricts use of fire-suppression chemicals near surface water sources and special status plant species populations; however, this restriction under Alternative D includes a 200-foot buffer around these plant populations. Restrictions on soil disturbance during suppression activities are similar to Alternative B. Under Alternative D, wildland fires generally are suppressed in areas of high-density urban and industrial interface with intermingled BLM-administered lands.

Proactive Management Actions. In areas of low-density urban and industrial interface where BLM-administered lands occur in large blocks, wildland fires can be used to achieve resource objectives. Alternative D allows wildland fire use to meet fire and fuels management objectives similar to Alternative B. Similar to alternatives B and C, Alternative D also allows wildland fire use in the Raymond Mountain WSA.

Alternative D places greater restrictions on wildland fire management than Alternative A; however, Alternative D uses wildland fire to meet management objectives, potentially reducing hazardous fuel loads. Overall, Alternative D is anticipated to have less of an adverse impact to wildland fire management relative to Alternative A.

4.3.1.3 Conclusion

The allowable uses and management actions for resources and resource uses are anticipated to result in a mix of beneficial and adverse impacts relative to wildland fire management. Based on a balance of restrictions and proactive management actions, Alternative D could have the least adverse impact to wildland fire management. Although Alternative C has the least restrictions, the unrestricted full suppression tactics could result in a long-term adverse impact by contributing toward maintaining high fuel loads and a continuing high risk of wildland fires. Alternative B places the most restrictions on wildland fire suppression of any alternative and, therefore, has the most potential for adversely impacting wildland fire-suppression activities. Conversely, while alternatives B and D have the most restrictions, these restrictions could indirectly benefit fire management in the long-term because greater reliance on limited tactics likely would result in a higher acreage of land burned during wildland fires, thus contributing toward a reduction of fuel loads in the planning area. Overall, alternatives B and D are anticipated to have similar and more beneficial impacts to wildland fire management relative to Alternative A.

4.3.2 Planned/Prescribed Fire

Prescribed fire can be used to achieve measurable landscape-level or site-specific level objectives, such as reducing hazardous fuel loads, creating diversity within vegetative communities, enhancing livestock management, improving certain desirable wildlife habitats, regenerating decadent vegetative communities, and improving watershed health. Most of the prescribed fires in the planning area will occur in mountain shrub and aspen communities. Stipulations from other resources allowing or preventing prescribed fires to be conducted in certain areas or at certain times of the year are direct impacts to prescribed fire management.

4.3.2.1 Methods and Assumptions

Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife, certain desirable wildlife habitats, and vegetative communities. Prescribed fire also can have a long-term beneficial impact to other resources and resource uses in the planning area by reducing fuel loads and reducing the risk of catastrophic wildland fire.

Methods and assumptions used in this impact analysis include the following:

- Under all alternatives, threatened and endangered species consultation and coordination will be conducted, where applicable, regardless of alternative.
- Appropriate Management Response (AMR) will be used.
- The *Fire Management Plan Southwestern Zone Wyoming BLM 2004* will implement the fire management direction on BLM land within the planning area (BLM 2004f).
- Air quality currently is not affecting the ability to conduct prescribed burns; however, the more stringent air quality standards are, the more likely it is that they will affect that ability in the long term, with development occurring elsewhere in the region.
- Where livestock grazing occurs, it is BLM policy that areas burned must be rested from grazing for a minimum of two consecutive growing seasons after the fire is extinguished.

4.3.2.2 Analysis of Alternatives

Refer to the Analysis of Alternatives section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

The short- and long-term impacts from prescribed fire will benefit fire and fuels management and other resources; however, by removing existing vegetation and exposing soil, fire does provide an opportunity for the establishment of INNS and the potential for soil erosion. Smoke from fire temporarily degrades local air quality; however, all prescribed fire activities will comply with state and federal air quality standards. Wind and other factors can cause prescribed fire to escape, becoming a wildland fire.

Where livestock grazing occurs, it is BLM policy that prescribed burn areas are rested from grazing a minimum of two consecutive growing seasons, with some exceptions based on environmental conditions and management objectives consistent with *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management* (BLM 1998a). Land ownership patterns in the planning area can impede the ability to conduct prescribed burns. Prescribed burns generally are not possible where domestic livestock producers are financially unable to withstand two growing seasons rest, as required by BLM policy. This policy may impact prescribed fire management because it restricts the ability to use prescribed fire as a management tool. Conflicting resource demands also can adversely impact prescribed fire management.

Alternative A

Approximately 40,000 acres of short-term disturbance are anticipated from prescribed fire under Alternative A. All but 400 acres of this disturbance is reclaimed (Appendix M).

Restrictions. No specific areas are identified as excluded from prescribed fire under Alternative A. Prescribed fire is used to manipulate vegetation on areas identified for treatment in the range, forestry, and wildlife programs.

Proactive Management Actions. Prescribed fire is used to meet fire and fuels resource management objectives, reduce hazardous fuels, reintroduce fire in its natural role to the ecosystem, and improve plant community health.

Alternative B

Similar to Alternative A, approximately 40,000 acres of short-term disturbance will occur from prescribed fire under Alternative B (Appendix M). All but 400 acres of this disturbance are reclaimed.

Restrictions. Under Alternative B, the following areas are excluded from prescribed fires: Bridger Butte ACEC, Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout

Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and the Bear River Divide trail landmark. The exclusion of these areas from treatment may increase hazardous fuels and the risk of catastrophic fire in these areas.

Proactive Management Actions. Similar to Alternative A, Alternative B uses prescribed fire to achieve fire and fuels resource management objectives, reduce hazardous fuel loads, and reintroduce fire in its natural role back into the ecosystem. This approach could result in a beneficial impact to fire management in the planning area. In addition, use of prescribed fire could have beneficial impacts in the Raymond Mountain WSA, including better simulation of natural regeneration of vegetation.

Alternative C

Under Alternative C, no short- or long-term disturbance is anticipated by BLM actions from prescribed fire.

Restrictions. While use of prescribed fire is allowed under Alternative C, no specific requirements or restrictions on use of prescribed fire are identified for this alternative.

Proactive Management Actions. Under Alternative C, prescribed fire is not considered to achieve fire and fuels resource management objectives, reduce hazardous fuel loads, and reintroduce fire in its natural role back into the ecosystem. Without treatments, the fire and fuels management objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) will not be met, an adverse impact to this resource.

Alternative D (Preferred Alternative)

Similar to alternatives A and B, approximately 40,000 acres of short-term disturbance will occur from prescribed fire under Alternative D (Appendix M). All but 400 acres of this disturbance are reclaimed.

Restrictions. The Bridger Butte ACEC is excluded from prescribed burns under Alternative D.

Proactive Management Actions. Similar to Alternative B, Alternative D uses prescribed fire to meet fire and fuels resource management objectives and reestablish fire in its natural role in the ecosystem. Similar to alternatives A and B, prescribed fire could be used to reduce hazardous fuels under Alternative D. This approach could result in a beneficial impact to fire management in the planning area. Alternative D allows the use of prescribed fire in the following areas to protect or enhance the sites: Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and the Bear River Divide trail landmark. The fewer the exclusions to the use of prescribed fire, the greater the benefit to the fire management program and the greater the potential to meet fire and fuels objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f).

4.3.2.3 Conclusion

Using prescribed fire to achieve measurable objectives for other resource programs and to manage fuels are anticipated to benefit prescribed fire management. Alternative D is anticipated to result in greater beneficial impacts to prescribed fire management and more beneficial impacts compared to Alternative A. Alternative C has the least beneficial impact because by not considering the use of prescribed fire in achieving resource objectives, the fire management program is unlikely to meet fire and fuels management goals. Alternative B imposes greater restrictions on prescribed fire use than Alternative A, resulting in fewer beneficial impacts compared to Alternative A.

4.3.3 Stabilization and Rehabilitation

Stabilization and rehabilitation techniques can be required following fires and following fire-suppression activities. The spread of cheatgrass, in particular, is possible in areas that have been burned or disturbed due to fire-suppression activities. Widespread presence of cheatgrass can alter the local fire regime and

fire-recurrence interval. Impacts are measured by the ability to conduct stabilization and rehabilitation efforts and the success of these efforts. Restrictions to stabilization and rehabilitation are considered a direct adverse impact. Indirect impacts could occur where stabilization and rehabilitation introduce a long-term risk of recurrent fire, requiring new stabilization and rehabilitation efforts. According to the *Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook* (USDI 2005c), which could be implemented on wildland fires under all alternatives, emergency stabilization and (or) rehabilitation actions will promote the reestablishment of healthy native plant communities, protect and sustain ecosystems, and will be evaluated on a site-by-site basis following wildland fires.

4.3.3.1 Methods and Assumptions

The Instruction Memorandum (IM) 2006-073, Weed-Free Seed Use on Lands Administered by the BLM, applies to all alternatives. Specifically, IM 2006-073 states: "All Field Offices are required to use seed on public lands that contain no noxious weed seed and meets certified seed quality. All seed to be applied on public land must have a valid seed test, within one year of the acceptance date, from a seed analysis lab by a registered seed analyst (Association of Official Seed Analysts) (BLM 2006c)." Refer to the Methods and Assumptions section for Unplanned/Wildland Fire for additional methods and assumptions.

4.3.3.2 Analysis of Alternatives

Refer to the Analysis of Alternatives section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

The types and context of impacts anticipated for stabilization and rehabilitation because of the various alternatives are similar. Impacts to stabilization and rehabilitation from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Alternative A does not require the use of certified weed-free mulch for stabilization and rehabilitation projects. Stabilization and rehabilitation success could be limited and the potential exists for the introduction of INNS.

Alternative B

Requiring the use of certified weed-free mulch in stabilization and rehabilitation projects will result in greater beneficial impacts compared to Alternative A.

Alternative C

Under Alternative C, the use of certified weed-free mulch in stabilization and rehabilitation projects is recommended, but not required, resulting in similar adverse impacts compared to Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the use of certified weed-free mulch in stabilization and rehabilitation projects is required and anticipated to result in greater beneficial impacts compared to Alternative A.

4.3.3.3 Conclusion

Alternatives B and D are anticipated to have similar and greater beneficial impacts to stabilization and rehabilitation efforts compared to Alternative A. The requirement for using certified weed-free mulch in stabilization and rehabilitation projects is anticipated to reduce the spread of INNS in the planning area because of fire. Alternatives A and C are anticipated to have similar and less beneficial impacts due to the lack of a requirement for the use of certified weed-free mulch in stabilization and rehabilitation projects.

4.4 Biological Resources

This section describes compliance with the Endangered Species Act (ESA) for special status species, as well as the anticipated environmental consequences (i.e., impacts) each alternative could have on habitat fragmentation and biological diversity. The potential environmental consequences to individual biological resources (i.e., vegetation, fish, wildlife, and special status species) are described following the Habitat Fragmentation and Biological Diversity section, below.

Special Status Species

Section 7 of the ESA requires federal agencies (such as BLM) to address impacts on species listed under the ESA through consultation with the USFWS. Informal conferencing and consultation with the USFWS occurs for authorized federal activities that potentially affect habitats for endangered, threatened, proposed, and candidate species within the planning area (USFWS 2004). As part of informal consultation, the BLM's Kemmerer Field Office receives an annual list of species listed or proposed for listing as threatened or endangered.

Kemmerer's Biological Assessment (BA) for the Draft EIS analyzes the potential affects of the preferred alternative on those species listed as threatened or endangered and occurring in the planning area (BLM 2007). Habitat conservation measures identified in the BA are applied to surface-disturbing and disruptive activities, as appropriate, to protect species listed as threatened or endangered. In addition, surveys for threatened and endangered species on federal land or on split-estate land are conducted in potential habitats prior to approval of projects or activities that could impact these species. Reasonable and prudent measures and terms and conditions identified in Statewide Programmatic BAs and Biological Opinions (BOs) for listed plant and wildlife species within the planning area also will be implemented, as appropriate.

Habitat Fragmentation and Biological Diversity

Habitat fragmentation and biological diversity are not resources or resource uses; rather, they are conditions within the planning area that can be impacted by BLM management actions and allowable uses as expressed in the alternatives (see Chapter 2). As such, habitat fragmentation and biological diversity are described immediately following this introduction and prior to the descriptions of anticipated impacts to individual biological resources. Habitat fragmentation is anticipated to continue and incrementally increase in the future commensurate with surface-disturbing activities and associated development. The Secretary of the Interior has the authority and responsibility to protect the environment and allow for the development of resources on federal lands.

The Tenth Circuit Court of Appeals in Sierra Club vs. Peterson (717F.2d 1409, 1983) found that "on land leased without an NSO stipulation, the DOI [U.S. Department of the Interior] cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building." For these reasons and to minimize habitat fragmentation, large blocks of contiguous habitats with low oil and gas development potential are administratively unavailable for oil and gas leasing in alternatives B and D.

The extent or intensity of fragmentation is expected to vary by alternative. The extent of fragmentation under each alternative is primarily anticipated to be a function of the amount of long-term surface disturbance in the planning area and proactive management actions anticipated to minimize fragmentation.

Management challenges regarding habitat fragmentation and future management of the planning area include balancing the requirement for multiple use and sustained yield with management of a diversity of resources and resource uses that sometimes conflict. These challenges are complicated by the intermingled public and private ownership pattern that exists within the planning area in the checkerboard found in the southern part of the planning area. On the other hand, relatively large blocks of contiguous habitat are north of the checkerboard in Lincoln County. Future challenges regarding habitat fragmentation include managing the location and constructing, maintaining, and operating infrastructure required for mineral, energy, transportation, and other development, all while adhering to habitat requirements of wildlife and special status species occurring in the planning area. Additional management challenges in the planning area include controlling the spread of INNS, managing fire suppression and stabilization and rehabilitation activities, and integrating activities of resources affecting habitat fragmentation. Management actions anticipated to address the challenges of habitat fragmentation are included as part of the alternatives (primarily vegetation) described in Chapter 2.

Under all alternatives and for the life of the plan, biological diversity is anticipated to remain within the range of conditions bounded by the current situation; however, the rate of change in biological diversity is anticipated to vary by alternative. Allowable uses and management actions primarily anticipated to impact biological diversity are described below under the topics of surface-disturbing activities, proactive management actions, fire and fuels management, and INNS.

Actions affecting biological diversity include BLM-authorized actions within the planning area, as well as external actions beyond the control of the BLM. External factors influencing biological diversity include changes to the natural fire regime, urbanization (e.g., WUI), agricultural conversion of rangelands, INNS, and energy development. Maintaining the diversity and distribution of habitats within the planning area is complicated by existing conditions of land ownership, lack of a natural fire regime, conflicting land use, INNS, WUI, and habitat fragmentation. The impacts of potential habitat changes on wildlife and special status species are discussed under Fish and Wildlife Resources and Special Status Species elsewhere in this chapter.

Surface-disturbing Activities. Surface-disturbing activities on BLM-administered land vary with the alternatives. Under alternatives A and C, surface-disturbing activities are managed to comply with current standard practices and the Wyoming BLM Mitigation Guidelines. In addition, oil and gas-related activities are restricted on slopes greater than 25 percent and NSO for fluid minerals currently is allowed on slopes greater than 40 percent. Alternative B prohibits surface-disturbing activities on highly erosive and sensitive soils and slopes of 10 percent or greater without adequate soil mitigation, while Alternative D avoids surface disturbance on slopes of 20 percent or greater. Under all alternatives, guidance BMPs are applied to minimize impacts of surface-disturbing activities, whether they are on highly erosive soils or not. As shown in Table 4-1, projected long-term surface disturbance is lowest for Alternative B, followed by Alternative D. Projected long-term surface disturbance for alternatives A and C is approximately double that of Alternative D. The actions proposed under alternatives B and D to address fragmentation of habitats indirectly reduce the amount of surface disturbance occurring in contiguous blocks of native vegetation in the planning area.

In general, surface-disturbing activities are anticipated to result in long-term loss, degradation, and fragmentation of habitats, thereby impacting biological diversity of the planning area. Construction of well pads and roads, pits and reservoirs, and pipelines and powerlines; mining; and vegetation treatments are the kinds of surface-disturbing activities anticipated in the planning area. Surface disturbance associated with permanent linear infrastructure (roads) is anticipated to have the greatest adverse impact on habitat fragmentation. Alternative B is expected to have the least miles of linear features of all alternatives (Appendix M).

Proactive Management Actions. Table 2-3 describes proposed management actions (see Vegetation) for addressing habitat fragmentation in accordance with the different alternatives. Current management

does not specifically address habitat fragmentation; likewise, management actions to address habitat fragmentation are not proposed for Alternative C. Alternatives B and D propose to address the challenge of habitat fragmentation by managing large, contiguous blocks of federal land by maintaining or enhancing sagebrush, aspen, and mountain shrub communities. Alternatives B and D maintain connections between these community types and ensure construction disturbance is minimized to the smallest acreage possible, while still considering engineering feasibility and safety, resulting in greater beneficial impacts to habitat fragmentation than Alternative A.

Fire and Fuels Management. Wildland fire and prescribed fire could impact biological diversity and are anticipated to result in similar adverse short-term impacts to habitats; however, the long-term benefits of fire, especially prescribed fire, generally are anticipated to improve the quality of habitat types and contribute to the maintenance of biological diversity. The lack of a natural fire regime is the primary fire ecology factor impacting biological diversity. Over time, lack of a natural fire regime is anticipated to reduce biological diversity in the planning area. Current management does not specifically address lack of a natural fire regime; however, it does utilize prescribed fire to manipulate vegetation to achieve resource objectives. Alternatives B and D propose to utilize prescribed fire to achieve measurable objectives for resource management, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems within the planning area, resulting in greater beneficial impacts to biological diversity than Alternative A. Alternative C suppresses all wildland fires and does not utilize prescribed fire to achieve measurable objectives for resource management, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems within the planning area.

INNS. To various degrees, INNS are anticipated to continue to spread within the planning area under all alternatives. This spread is anticipated to contribute to the loss, degradation, and fragmentation of habitats, as well as to the reduction of biological diversity over time.

Conclusion. The conditions of habitat fragmentation and biological diversity are anticipated to be impacted by current management and by management actions proposed as part of the Action Alternatives. Overall, habitat fragmentation is anticipated to have adverse impacts on biological diversity and biological resources. The primary factors impacting habitat fragmentation in the planning area are surface-disturbing activities that break blocks of habitat into smaller units and proactive actions to avoid or minimize fragmentation. The primary factors impacting biological diversity in the planning area are surface disturbance, fire and fuels management, INNS, and habitat fragmentation. Considering these factors, Alternative B is anticipated to contribute the least to habitat fragmentation and have the least adverse impact to biological diversity. For the same reasons, alternatives A and C are anticipated to contribute the most to habitat fragmentation and have the greatest adverse impact to biological diversity. Alternative D is anticipated to result in less habitat fragmentation than alternatives A and C, but more than Alternative B.

4.4.1 Vegetation – Forests, Woodlands, and Forest Products

Actions occurring through implementing each alternative could affect forests, woodlands, and forest products. This section describes the potential impacts each alternative may have on forests, woodlands, and forest products in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to forests, woodlands, and forest products. Refer to Map 21 for vegetation.

Actions restricting forest management practices or contributing to the decline in abundance, distribution, or health of forests, woodlands, and the availability, quality, and quantity of forest products are considered adverse impacts. Indirect impacts include any change in the forest and woodland species, vigor, health, site quality, and vegetative community type because of natural forces (e.g., insect and disease, fire, and drought conditions), management actions from other resources, or failure to implement management actions. Conversely, beneficial impacts include actions that enhance management, improve health, and protect and restore forests and woodlands in the planning area. For the purpose of this

analysis, a short-term impact is one that is apparent within 5 years. A long-term impact is one that persists for more than 5 years.

Both natural and human activities could produce beneficial or adverse impacts to forest and woodland communities. Natural regeneration is an example of this. In an old growth forest, natural regeneration restores genetic diversity, sustained yield, and an uneven-aged stand to benefit continuous production, insect and disease control, and produce economic benefits by proper land utilization, soil and water conservation, and eliminating the cost of planting. Alternatively, natural regeneration can introduce conifers into aspen stands, thereby reducing the size of or out-competing the aspen stand.

4.4.1.1 Methods and Assumptions

Methods and assumptions used in this analysis include the following:

- Forest and woodland management treatments promote forest and woodland preservation, production, health, and value.
- Livestock grazing in forests and woodlands could adversely impact the forest resource by limiting regeneration and, to a lesser degree, by compacting soils due to high concentrations.
- The forest generally is getting older in the planning area.
- Aspens generally are declining due to advancement of ecological conditions and succession. The advancement of ecological conditions also leads to encroachment of evergreen species into aspen stands; for example, shade-tolerant conifers invade and eventually shade out aspen stands, contributing to their decline.
- The structure and stocking of the forest is different from historic conditions; more trees and higher stocking rates exist today compared to historical conditions. The historical condition is the baseline toward which alternatives are striving to achieve. Those alternatives that will better achieve historical conditions are better for the forest resource.
- More ground fuels and ladder-type fuels exist today compared to the past.
- Insect and disease mortality is higher today than it was in the past.
- Forests and woodlands are important for the watershed, visual resources, and wildlife habitats. Some of these values are natural, some are sociological. For example, wildlife need habitats, not visual quality. Human, sociological, economic, and cultural influences are related to managing forestlands and must be considered.
- Management of the forest could increase the water yield from the forest.
- Water quality could be adversely impacted in the short term due to mechanical forest treatments (soil erosion, etc.), but overall, the consequences of these treatments are anticipated to be negligible.

4.4.1.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting forests, woodlands, and forest products primarily include surface-disturbing activities and proactive management actions.

As forests, woodlands, and forest products are impacted by the alternatives, forests, woodlands, and forest products can, in turn, impact other resources. The impacts of forests, woodlands, and forest products on other resource topics (i.e., physical, biological, fire and fuels management, etc.) are discussed under their respective impacted resource sections in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to forests, woodlands, and forest products because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to forests, woodlands, and forest products from surface-disturbing activities and proactive management actions are described under individual alternatives. The following paragraphs provide a general description of potential impacts to forests, woodlands, and forest products not anticipated to differ among alternatives.

Potential air quality restrictions on vegetative treatments vary depending on air quality conditions within the immediate area at the time of proposed treatments. Potential short-term adverse impacts to vegetative treatments include planning and timing restrictions to minimize emissions associated with fugitive dust or smoke.

Direct long-term adverse impacts to forest management occur in localized areas where new cultural resource sites are discovered. While not typically found in forested areas, cultural sites could restrict location of vegetative treatments and access roads, thus decreasing the accessibility and the forest acreage available for treatments. However, it should also be noted that the size of a cultural site is only a small percentage of the total acreage involved.

Potential impacts from VRM classifications, soil and water resources, air quality, INNS, NHTs, transportation, OHV use, wildlife, and special status species are anticipated to influence the size and shape of forest and woodland treatments and restrict the location and construction of access roads. Silviculture treatments in forests and woodlands (e.g., burning for regeneration purposes) defer livestock grazing for two growing seasons to allow for regeneration (BLM 2004q).

Recreational use within forestlands could result in indirect short-term adverse impacts from accidental fires, unauthorized woodcutting within and adjacent to campgrounds, and degradation of vegetation along trails and roads. Unless properly designed and managed, developing recreational trails, both motorized and nonmotorized, could adversely impact forests and woodlands through soil erosion. Over time, increased development of nonmotorized and motorized trails and trailheads could increase recreational use and associated impacts to forestlands.

Developing wind-energy sites is anticipated to have a localized, but direct, adverse impact on forestlands and forest management activities for all alternatives. The development of facilities and infrastructure associated with wind energy, transportation networks, minerals, reservoirs, and recreation is anticipated to increase habitat fragmentation in the planning area and remove forest acres available for management.

Short-term impacts regarding the timing or location of vegetative treatments may result from temporary surface use restrictions, seasonal restrictions, or other surface development restrictions within buffers for special status species, raptors, and bald eagle roost sites located within forests and woodlands.

The fragmentation of forests and woodlands could increase depending on the forest prescription applied; however, this impact is anticipated to be minimal because regeneration of treated areas will create forest and woodland diversity and age-class diversity. In addition, a direct long-term impact to forestlands by the disposal of forestlands in the Star Valley area is anticipated.

Alternative A

Surface-disturbing Activities. Under Alternative A, the acres of short-term surface disturbance for prescribed fire and silviculture treatments in forest and woodlands are not specified. However, the volume of timber removed from treated acres will not exceed the annual sustained yield capacity of these lands. Short-term surface disturbance is anticipated to increase the potential for short-term adverse impacts to soil erosion, water quality, and INNS; however, the relatively small size of treatment areas and the use of BMPs are expected to minimize these short-term impacts. The long-term benefits from prescribed fire and silviculture treatments will outweigh the short-term impacts by reducing fire hazards

through fuel removal, increasing opportunities for natural regeneration and controlling insects and disease.

Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which also would minimize impacts to forest communities. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and reduce fuel loads, resulting in a beneficial impact for forest resources.

Proactive Management Actions. Under Alternative A, approximately 19,008 acres of forestland are managed to meet public demand. Existing forestlands are perpetuated and increased as they are treated. Timber removal in the planning area will not exceed the annual sustained yield capacity; however, specific acreage requirements for managing or limiting timber management are not identified under Alternative A. Likewise, requirements for managing forestland within the Raymond Mountain WSA and old growth forest are not identified in the existing plan. Management actions are anticipated to benefit these vegetation communities by improving the overall conditions of the forests and enhancing age and species diversity.

Alternative B

Surface-disturbing Activities. Anticipated impacts under Alternative B for surface-disturbing activities are expected to be similar in nature to those described under Alternative A. Under Alternative B, approximately 50 acres of forestland ecosystem management areas and 50 acres of woodland ecosystem management areas are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Forest restoration would occur at a moderate level under this alternative so that the overall impacts to the associated resources would be less intrusive initially and over time. As with Alternative A, the short-term surface disturbance increases the potential for short-term adverse impacts, but the relatively small size of treatment areas and the use of BMPs minimize these short-term impacts, and the long-term benefits from prescribed fire and silviculture treatments will outweigh the short-term impacts.

Under Alternative B, soil disturbances are not allowed during fire suppression without consent from the BLM authorized officer. Similar to Alternative A, prescribed fire, as well as chemical, biological, and mechanical treatments, could be used to meet fire and fuels resource management objectives, except the objectives to be met are based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area.

Proactive Management Actions. Under Alternative B, approximately 19,008 acres of forest ecosystem management areas would be actively managed and would have an allowable probable sale quantity of 444 cubic feet (CCF) (200 thousand board feet [MBF]), the least of the Action Alternatives.

Approximately 3,000 acres of combined forestlands and woodlands within the Raymond Mountain WSA are reserve managed by prescribed fire or wildland fire use to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives. No mechanical and (or) surface-disturbing activities are prescribed. No forest products are removed from this area. The forestlands within the WSA are called “reserved forest ecosystem management areas.”

Approximately 15,000 acres of woodland (e.g., aspen, aspen conifer, and juniper) within the woodland ecosystem management areas are actively managed. No specified annual sale quantity is identified. Forest products are provided as a byproduct consistent with forest health, landscape restoration, and reduction of forest fuels objectives.

Under Alternative B, old growth forest areas are retained and other forested areas may be restored to old growth conditions at appropriate locations and distribution levels as evaluations occur using an adaptive management approach. Old growth management areas include coniferous trees older than 150 years and aspen trees older than 100 years in association with various old growth forest characteristics. Pre-settlement old growth forest characteristics are identified for the various forest types. Connectivity of existing or potential old growth areas is adopted whenever feasible. Specific acreages for treatment identified under Alternative B will benefit forest and woodland resources more than Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, approximately 150 acres of forestland ecosystem management areas and 100 acres of woodland ecosystem management areas are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Anticipated impacts under Alternative C for surface-disturbing activities are expected to be similar in nature to other alternatives; however, more acres of forestland and woodland will be specified for silviculture treatment or prescribed fire than under alternatives B or D.

Under Alternative C, all wildland fires are suppressed in the planning area and no soil disturbances are allowed within the planning area from heavy equipment during fire suppression unless private or public habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment, some direct impacts are reduced. However, by not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to forest communities. In addition, by suppressing all fires, Alternative C increases the potential for fuel loading and spread of INNS, thereby increasing the risk of wildland fire and insect epidemics relative to other alternatives and adversely impacting this resource.

Proactive Management Actions. Under Alternative C, approximately 19,008 acres of forestland are actively managed under forest ecosystem management areas with an annual allowable probable sale quantity of 1,333 CCF (600 MBF), the highest of all alternatives.

Approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA and 15,000 acres of woodland (aspen and juniper) under Alternative C is the same as under Alternative B.

Under Alternative C, old growth forest areas are retained at appropriate locations and distribution levels as evaluations occur using an adaptive management approach. Old growth management areas include coniferous trees older than 150 years and aspen trees older than 100 years in association with various old growth forest characteristics. Presettlement old growth forest characteristics are identified for the various forest types. Connectivity of existing or potential old growth areas is adopted whenever feasible.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, an average of 75 acres of forestland ecosystem management areas and 75 acres of woodland ecosystem management areas are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Anticipated impacts under Alternative D for surface-disturbing activities are expected to be similar in nature to other alternatives, but the acres of forestland and woodland specified for silviculture treatment or prescribed fire and associated impacts will be more than under Alternative B and less than under Alternative C.

Under Alternative D, wildland fire suppression will follow AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to provide for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high density urban and industrial interface with intermingled BLM-administered lands. Fire

suppression also will allow achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). Soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire, as well as chemical, biological, and mechanical treatments, is used to meet fire and fuels resource management objectives based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, similar to Alternative A, which could improve habitats and result in a beneficial impact for forestlands and woodlands. Under Alternative D, opportunities to utilize wildland fire to reduce fuel loads will be taken, resulting in improved forest and woodland health in fire-dependent ecosystems.

Proactive Management Actions. Approximately 19,008 acres of forestland will actively be managed in forest ecosystem management areas with an annual allowable probable sale quantity of 667 CCF (300 MBF). Approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA, 15,000 acres of woodland (aspen and juniper), and old growth forest areas is the same as under Alternative B, resulting in similar impacts to forests and woodlands.

4.4.1.3 Conclusion

The types of surface disturbance are anticipated to be similar for all alternatives, with the primary difference attributed to the acres of silviculture treatments and prescribed fire. Alternative B treats the least acreage (100 acres for forestlands and woodlands), followed by Alternative D (150 acres), and Alternative C (250 acres). Acres proposed for silviculture treatment and prescribed fire are not specified under Alternative A. The lack of any specified treatment acreage goals may increase the potential for insect and disease damage and fuel loading, thereby increasing the risk of wildland fire and insect epidemics relative to other alternatives. Therefore, it is anticipated that silviculture treatments proposed under alternatives B, C, and D would benefit forest and woodland health, including insect and disease control and fuel reduction. The greater the number of acres treated, the greater the benefit.

Under alternatives A, B, and D, allowing some wildland fires and using prescribed fire to reduce fuel loads would result in improved forest and woodland health in fire-dependent ecosystems, in contrast to Alternative C, which emphasizes the suppression of all wildland fires and no prescribed fire. Alternatives A, B, and D are similar in the use of wildland fire suppression within certain parameters, with Alternative D being most specific. Therefore, alternatives A, B, and D are anticipated to provide the greater benefit to forests, woodlands, and forest products with regard to management of wildland and prescribed fire.

For all alternatives, the same amount of land (19,008 acres) is actively managed for forest resources. However, there is a greater allowable sale quantity under Alternative C (600 MBF), followed by Alternative D (300 MBF) and Alternative B (200 MBF). No allowable sale quantity is specified under Alternative A. The greater the allowable sale quantity, the greater the benefit to forest products.

Under Alternative A, 3,000 acres within the Raymond Mountain WSA and 15,000 acres of woodlands are not managed, as proposed under alternatives B, C, and D. In addition, old growth forests are retained under alternatives B, C, and D, whereas no similar action exists under Alternative A. Management of 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA, 15,000 acres of woodlands, and retaining old growth forests is a beneficial impact to forest resources.

Restrictions to protect other resource values are anticipated to adversely impact forests, woodlands, and forest products; however, these restrictions would benefit forest resources. Several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources) under the different alternatives with the most acreage proposed under Alternative B and the least under alternatives C and A.

The following conclusion is formed from meaningful differences in surface-disturbing activities; silviculture treatments including prescribed fire; fire and fuels management actions; proactive management actions; and restrictions by other resources and resource uses: Alternative C allows for greater allowable sale quantity and acres managed per year; therefore, provides greater benefits to forest products and greater benefits to creating overall healthier forest and woodlands. Beneficial impacts for forest products, and the management of healthier forest and woodlands, are anticipated to be the least under Alternative B.

4.4.2 Vegetation – Grassland and Shrubland Communities

Actions contributing to the decline in abundance or distribution of grassland and shrubland communities are considered adverse impacts. Conversely, beneficial impacts to grassland and shrubland communities include actions that protect or restore these communities in the planning area.

Direct impacts to grassland and shrubland communities result from surface-disturbing and other activities that cause vegetation removal and mechanical damage to plants. Surface-disturbing activities generally are considered a direct adverse impact to grassland and shrubland communities. Livestock grazing, wildlife use, wildland fire, and vegetative treatments (e.g., prescribed fire, mechanical, chemical, or biological) also have direct impacts on these communities, which may be both adverse and beneficial. Indirect impacts to grassland and shrubland communities result from activities that alter the quality and health of these communities. For example, activities resulting in soil compaction, erosion, changes in hydrology, and encroachment of INNS are considered indirect impacts. Beneficial impacts to grassland and shrubland communities include activities that minimize, reduce, or prevent the spread of INNS into these communities and vegetative treatments to improve these communities.

For the purpose of this analysis, short-term impacts to grassland and shrubland communities comprise those activities that contribute to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to grassland and shrubland communities are those that require more than 5 years to manifest on the surface. Refer to Map 21 for vegetation.

4.4.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Almost all surface disturbances from oil and gas development could occur within grassland and shrubland communities.
- Based on the definition of surface-disturbing activity (mechanized actions), oil and gas development is identified as the primary source of surface disturbance in the planning area.
- Surface disturbances generally increase the potential for accelerated erosion.
- Surface disturbances substantially increase the likelihood of the spread of INNS in an area.
- The placement of supplements can affect the distribution of livestock grazing within grassland and shrubland communities.
- Grazing and browsing, whether by livestock or wildlife, is important for maintaining the health of grassland and shrubland communities. Improper grazing can decrease plant vigor and ground cover, lead to increased erosion, degrade soil nutrients and water retention, and impact rangeland health.
- Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health and are applied under all alternatives.

- The BLM and grazing lessees strive to manage livestock grazing to maintain or improve rangeland health.
- The primary conduit for the initial establishment of the spread of INNS is through the road network.
- Fire plays an intricate role in these communities, particularly shrubland communities.
- Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife and certain desirable wildlife habitats.

4.4.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact grassland and shrubland communities include all surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, control of INNS, and proactive management actions. These allowable uses and management actions are expected to result in changes that directly or indirectly influence diversity, productivity, successional stage, nutrient cycling, and continuity of grassland and shrubland communities.

Impacts Common to All Alternatives

The types of impacts projected to occur to grassland and shrubland communities because of the various alternatives are similar; however, the extent and intensity of impacts is anticipated to vary by alternative. Therefore, impacts to grassland and shrubland communities from surface-disturbing activities, livestock and native ungulate grazing, OHV use, fire and fuels management, and proactive management actions are described under the individual alternatives. Described below are potential types of impacts common to all alternatives.

Surface-disturbing activities occur under all alternatives. BMPs for surface-disturbing activities are applied under all alternatives. Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions such as steep slopes, highly erosive soils, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts.

Surface disturbance also can indirectly impact grasslands and shrublands by contributing to the transport of INNS along the network of roads and watersheds. Soil compaction and erosion, modified fire-return intervals, and the spreading of INNS into native habitats are potential indirect impacts to grasslands and shrublands. Habitats are degraded, lost, and fragmented by activities such as fire and fuels management, grazing by livestock and wildlife, road and trail building, OHV use, and recreational activities.

Surface disturbance that occurs under each alternative will be reclaimed. The sooner successful reclamation occurs, the greater the benefit to grasslands and shrublands. Rehabilitation plans are developed and implemented on newly disturbed areas and for existing disturbances, as needed. Follow-up seeding and (or) corrective erosion control measures are required on areas of surface disturbance that experience reclamation failure until an acceptable stand of vegetation is achieved.

Grazing (both livestock and wildlife) provides both adverse and beneficial impacts to grasslands and shrublands, depending on grazing intensity, timing and season of grazing, range conditions, and precipitation regimes. Grazing can result in direct mortality to native plants through trampling or herbivory, indirect impacts due to soil compaction and erosion, changes in plant community composition and structure, and increased spreading of INNS (Fitch and Adams 1998). Native grasslands evolved with grazers and many grass species respond to leaf removal by spreading, which increases vegetation cover. Other beneficial impacts of grazing include reduction in competition by removal of encroaching woody plant cover; hoof action that keeps topsoil loose, increases litter and precipitation penetration, and incorporates seeds into soil; nutrient recycling; removal of wildfire fuels; and control of INNS with

properly timed grazing rotations and (or) species (e.g., goats). Rangelands provide open space and habitat for many wildlife species.

Other than under Alternative A, future use of certified weed-free seed reduces the establishment and spread of INNS for revegetation projects. Similarly, requiring certified weed-free forage to supplement livestock feeding could reduce the introduction and spread of INNS in these areas. However, wildlife and livestock continued use of areas where INNS are established serve as vectors for spreading INNS seeds and plant parts.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities from all actions listed in Appendix M could impact grassland and shrubland communities. Under Alternative A, surface-disturbing activities are evaluated on a case-by-case basis. Surface disturbance directly impacts plant communities through vegetation removal and mechanical damage to plants. Indirect impacts of surface disturbance on vegetation include soil compaction, erosion, changes in soil productivity, hydrology, and encroachment by INNS. These indirect impacts can limit recovery or rehabilitation of vegetative communities following disturbance. Conversely, vegetation treatments (e.g., mechanical methods, prescribed fire, prescribed grazing, or chemical treatment), while resulting in short-term disturbance, will result in long-term beneficial impacts to grassland and shrubland communities. Vegetation treatments can achieve vegetative objectives to increase plant and seral stage diversity, control INNS, improve the quality and quantity of vegetation for wildlife and livestock, and create or maintain the desired mosaic.

Under Alternative A, surface-disturbing activities will acknowledge existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current standard practices, the Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities, and the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a). Surface-disturbing activities are managed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance to reestablish healthy native plant communities based on preexisting composition (where possible) will begin within 1 year of the abandonment of operations. If unsuccessful within 3 years of initial seeding, follow-up seeding and soil nutrient testing will occur to determine if additional reclamation is needed.

Under Alternative A, short-term and long-term disturbances from BLM actions affect the largest amount of acreage of all alternatives. Under Alternative A, the impacts to grassland and shrubland communities associated with surface-disturbing activities are expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include damage to vegetation and spread of INNS. Long-term impacts occur beyond 5 years and primarily include loss of vegetation communities and habitats due to land development. Based on the case-by-case basis of reclamation actions under Alternative A and the projected amount of long-term disturbance acreage, Alternative A is expected to have the greatest short- and long-term adverse impacts to grassland and shrubland communities of the alternatives.

Fire and Fuels Management. Wildland fire and prescribed fire both have adverse and beneficial impacts on grassland and shrubland communities. In the short term, fire results in the direct loss of vegetation and, potentially, habitat, increased soil erosion and reduced water infiltration, and can promote the spread of INNS by leaving bare soil, which can out-compete native plants. In the long term, because of the role fire historically played in these communities, fire can increase vegetative species and seral stage diversity across the landscape, rejuvenate decadent plants, and improve the overall health of these communities. In shrubland communities, the impacts resulting from fire usually are long term and depend on the scale and severity of the disturbance. The potential for sagebrush shrublands to revert to

sagebrush depends on the acreage burned, the distance to seed sources, and the spread of INNS, such as cheatgrass, which can increase fire frequency. Limiting or protecting acreage from fire may, in some cases, lessen direct loss of grassland and shrubland communities and reduce the potential spread of INNS in the short term, but considering fire's historical role, the lack of fire may decrease the overall long-term health of these communities.

Fire-suppression activities can limit short- and long-term fire damage to vegetation, but they also can cause mechanical and chemical damage to vegetation and increase the likelihood of INNS spread into an area. Direct short- and long-term impacts to grassland and shrubland communities can occur from wildland fire and from fire-suppression tactics. Using full suppression tactics and (or) limited tactics can damage and remove vegetation, a direct adverse impact, and potentially spread INNS seeds on vehicles, tools, and humans, an indirect adverse impact. If INNS are already present in an area, spread can occur regardless of the type of suppression used.

Fire management also can benefit grasslands and shrublands. Prescribed fire is an important vegetation management tool used to achieve a desired vegetative condition, but it also carries some risk of INNS establishment and increased soil erosion. Prescribed fire can help meet specific management objectives, such as maintaining a range of seral stages within shrublands; however, prescribed fires generally are not possible in areas with oil and gas development or the WUI.

Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which also minimizes impacts to grassland and shrubland communities. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and result in a beneficial impact for grassland and shrubland communities. Based on the approach to fire management, Alternative A will have direct and indirect adverse impacts as well as beneficial impacts, to grassland and shrubland communities.

Livestock Grazing. Livestock grazing can have both beneficial and adverse impacts on the health and productivity of vegetative communities in rangelands. Over the last 50 years, rangeland conditions in the planning area have improved with the application of better grazing management practices. However, areas where rangeland health is most likely to be adversely impacted are areas where livestock congregate. These include areas containing water, shade, and (or) more palatable forage. Therefore, rangeland management often is geared toward improving the overall distribution of livestock within an allotment. This is accomplished through implementing BMPs, such as developing allotment management plans (AMPs) or coordinated resource management plans, changing grazing systems, and implementing range improvement projects (i.e., fencing, water-development projects, and salt and mineral licks). Kovalchik and Elmore (1992) describe the compatibility of livestock grazing using different grazing systems with willow-dominated plant associations similar to those found in some riparian areas of the planning area.

In addition to congregation areas, livestock movement transports seed and propagates of INNS, thereby expanding infestations of these species. Congregation areas, transport of INNS, and adverse impacts to vegetation from livestock and native ungulates historically have contributed to the challenge of managing rangeland health and productivity in the planning area.

Through proper grazing management, livestock grazing can benefit rangeland health by improving plant vigor, increasing vegetative cover, reducing competition among plant communities, and reducing INNS infestations. Livestock grazing includes hoof action that breaks up soil crusts, which restrict water infiltration and inhibit seedling establishment; removing old and decadent vegetation; and increase in spread and, therefore, cover and vigor of native vegetation, which decreases soil erosion. Healthier plant

communities are more resistant to the spread of INNS and other undesirable plant species. One tool used to decrease the spread of INNS in an area is to have livestock graze an INNS species at a crucial point in its life-cycle. For example, goats can graze thistle prior to seed set and cattle can graze areas infested with the annual grass cheatgrass in early spring, thereby removing the ability to set seed that year, thus reducing plant numbers and making water and nutrients more available to native vegetation.

On the other hand, long-term over-utilization by livestock or wildlife in grasslands and shrublands reduces abundance of certain native plants, allows less desirable forage species to increase, and allows INNS to enter and, in some cases, dominate communities. An indirect impact of overgrazing is a decrease in ground cover, resulting in an increase in runoff and soil erosion, which can impact the health of the entire plant community. These adverse impacts can be both short- and long-term.

The entire planning area currently is available for livestock grazing, with the exception of a few small parcels under Alternative A. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means of improving range conditions on category I and maintaining M and C category grazing allotments (see Glossary). The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management. Native ungulates are anticipated to have similar adverse impacts as livestock in areas where they concentrate. Short- and long-term adverse impacts to grassland and shrubland communities are anticipated under Alternative A.

OHV Use. OHV use disturbs soils, removes vegetation, and contributes to the spread of INNS, thus potentially impacting grasslands and shrublands. Under Alternative A, OHV use in the planning area is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA is designated as “closed” to OHV use.

OHV use on public lands can result in adverse short- and long-term impacts to vegetation in grassland and shrubland communities. A one-time disturbance resulting from OHV use causes physical damage to vegetation by breaking stems and branches and may disturb the soil surface depending on soil type, conditions, slope, and ground cover. Usually, with a one-time disturbance, plants and disturbed areas recover. However, with repeated use, new trails are established, resulting in long-term loss of vegetation, soil erosion, and spread of INNS into grassland and shrubland habitats. Areas where damage from OHV use is most likely to occur include stream crossings, areas with highly erosive soils, steep slopes, and vegetative communities with plants susceptible to physical damage, such as the woody plants. The soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative A are anticipated to indirectly and adversely impact grassland and shrubland communities.

INNS. Applying chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact grassland and shrubland communities. Under Alternative A, appropriate methods, herbicide types, and applications are used in areas of riparian vegetation, wetlands, and special status plant species, and can affect grassland and shrubland habitats within the restricted areas. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS.

Proactive Management Actions. Beneficial long-term impacts to grassland and shrubland health occur under each alternative to varying degrees by managing a percentage of these communities for other resources, such as wildlife migration routes and special status plant and wildlife species. Under Alternative A, vegetation resources are managed to comply with the ESA and BLM policy associated with management of special status species. Prescribed fire, wildland fire, and appropriate chemical, mechanical, and biological treatments are used to improve plant community health and meet resource objectives. Adverse impacts to grassland and shrubland communities may occur from Alternative A

having no regulations on the use of weed-free seed, mulch, forage, or other feeds that may introduce INNS to uninfested areas.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected short- and long-term surface disturbances from BLM actions to grasslands and shrublands are the lowest of all alternatives. Under Alternative B, approximately half the acres of short-term surface disturbance and one-third the acres of long-term disturbance are anticipated in the planning area compared to Alternative A. There is about 38 percent less acreage of federal mineral estate administratively available to oil and gas leasing compared with Alternative A, with the majority (86%) subject to the terms and conditions of a standard lease plus major constraints. Under Alternative B, there are increased restrictions on habitat fragmentation and protections for special status wildlife and plant species, which benefit the grassland and shrublands communities that support these species and minimize the spread of INNS and soil erosion.

Similar to Alternative A, surface-disturbing activities comply with current standard practices, the Wyoming BLM Mitigation Guidelines, and the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a). In addition, proposals for surface-disturbing activities within the planning area require prior soil surveys and analysis, knowledge of which would benefit all plant communities. This alternative prohibits surface-disturbing activities in areas identified as having fragile, chemical and biological crust, nonproductive, or low reclamation potential soil characteristics. Surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control and disturbances. Unlike Alternative A, transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under this alternative. Alternative B provides greater protection and minimizes impacts to soils compared to Alternative A, which provides greater protection and minimizes potential impacts to associated grassland and shrubland communities.

Interim reclamation of surface disturbance occurs within the first planting season after the rig is moved off location. Final abandonment of well locations will occur within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related actions, reclamation occurs within the first suitable planting season after operations have ceased. If a healthy native plant community, or other species as identified in an approved management plan, is not established within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. Appropriate reclamation standards are developed at the project level. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on pre-existing species composition or other species as identified in an approved management plan.

Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature as described under Alternative A, but differ in intensity and duration due to the decrease in number of acres disturbed and more stringent reclamation requirements. Based on the acreage of surface disturbance and the management actions implemented to reduce disturbance to grassland and shrubland communities, adverse impacts under Alternative B are expected to be less than Alternative A and all other alternatives.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire suppression except that under Alternative B, soil disturbances are not allowed during suppression activities without the consent of the authorized officer. Similar to Alternative A, prescribed fire, as well as chemical, biological, and mechanical treatments, could be used to meet fire and fuels resource management objectives, except the objectives to be met are based on acreage thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect

adverse impacts to grassland and shrubland communities from fire and fuels management under Alterative B are expected to be less than under Alternative A.

Livestock and Native Ungulate Grazing. Under Alternative B, the planning area could be available for livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with an emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coalmines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources.

Alternative B generally allows livestock grazing over the same area identified under Alternative A; however, areas identified for the protection of specific resource values would not be available under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including areas that support special status wildlife and plant species. Due to stricter management of livestock grazing, direct and indirect adverse impacts to grasslands and shrublands under Alternative B are expected to be less than under Alternative A and the other alternatives.

OHV Use. Under Alternative B, the same types of impacts described under Alternative A from OHV use are expected to occur; however, the extent of these impacts is expected to be less. Under Alternative B, a larger portion of the planning area is closed to OHV use (33,896 acres). A travel management plan is required if it is determined that a new road network is needed. No off-trail travel will be allowed. The soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least indirect and adverse impacts to grasslands and shrublands compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile of wetlands, riparian areas, and aquatic habitats, and vehicle and hand application is not allowed within ¼ mile of these same habitats. The greater the buffer area around sensitive resources that chemicals are applied or mixed, the less potential for impacts associated with vegetation removal, soil disturbances, or chemical spills to grassland and shrubland communities within the buffer area. Other implications for INNS due to wetland/riparian buffers include the difficulty in treating INNS within wetland systems. Therefore, there is the possibility of potential spread of INNS species where treatment options are limited under this alternative. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS. In addition to this requirement, Alternative B requires the use of certified weed-free forage and feeds for livestock supplementation to prevent the establishment of new weed areas. Therefore, adverse impacts to grassland and shrubland communities associated with wet areas from the application of INNS-control methods may be less for Alternative B than under Alternative A, and the threat of INNS spread would be reduced because Alternative A has no weed-free seed, mulch, forage, and feed stipulations. However, under Alternative B where chemical control is not allowed, INNS may spread via riparian areas into adjacent uplands.

Proactive Management Actions. Under Alternative B, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources). In comparison with the other alternatives, Alternative B also limits habitat fragmentation by maintaining connections among sagebrush, aspen, and mountain shrub communities and by maintaining or enhancing large contiguous blocks of these plant communities on BLM-administered land. In comparison with the other alternatives, Alternative B provides the least direct and indirect impacts and maximum protection of grassland and shrubland habitats.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short- and long-term surface disturbances from BLM management actions are the second highest of all alternatives. Under Alternative C, there are approximately 41,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources and protection and mitigation to address these activities. Restrictions to oil- and gas-related activities and reclamation of surface-disturbance requirements are similar to Alternative A. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under this alternative. Alternative C has similar mechanized vehicle travel restrictions to Alternative A (allowed on existing roads); however, Alternative C also opens the Raymond Canyon Trail in the WSA to mechanized vehicles, potentially allowing more disturbance to adjacent vegetation habitats. Direct and indirect adverse impacts to grasslands and shrublands from surface-disturbing activities under Alternative C are anticipated to be similar to or slightly less than under Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed from heavy equipment during fire suppression unless public or private habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment some direct impacts are reduced. By not using prescribed fire, which results in habitat improvement, Alternative C has the greatest potential to cause direct and indirect adverse impacts to grassland and shrubland communities.

Livestock and Native Ungulate Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as on other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows are available for livestock grazing. Grazing systems and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guides) other resource values. Restrictions on the location of salt or mineral supplements and range-improvement projects are the same as under Alternative A (i.e., they will not be allowed on areas with special status plant species). Due to a greater emphasis on livestock and less on vegetation habitat values under Alternative C, adverse impacts to grassland and shrubland communities are expected to be slightly greater than under Alternative A.

OHV Use. Under Alternative C, 32,787 acres are designated “closed” to OHV use. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative C are expected to produce slightly less indirect adverse impacts to grassland and shrubland communities when compared to Alternative A.

INNS. For the aerial-, hand- and vehicle-application of herbicides, Alternative C restrictions are the same as for Alternative A, except that buffer areas for mixing of chemicals in areas of sensitive resources are reduced by one-fifth. This action is not likely to affect grassland and shrubland communities within the buffer area. In addition to the recommendation to use certified weed-free seed and mulch in restoration projects, Alternative C also recommends the use of certified weed-free forage and feeds to prevent the introduction and establishment of new weed areas. These recommendations can benefit grasslands and shrublands by reducing the potential for spread of INNS.

Proactive Management Actions. Under Alternative C, vegetation resources are managed to comply with the ESA and BLM policy associated with management of special status species (same as Alternative A). However, in contrast to alternatives A and B, prescribed fire is not used, all wildland fires are suppressed, and appropriate chemical, mechanical, and biological treatments would not be used meet resource objectives. Under Alternative C, no BLM-administered lands are given special designation for

protection of sensitive resources, and the currently proposed designation for the Raymond Mountain ACEC would be lifted. This would remove or reduce protections from more shrubland and grassland communities. Alternative C may result in direct and indirect impacts similar to Alternative A and has the least protection of grassland and shrubland habitats compared to other alternatives.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, short- and long-term surface disturbance is the second lowest of all alternatives. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil and gas leasing consideration (slightly less than Alternative A), all of which are subject to the terms and conditions of the standard lease form. Approximately 75 percent of the acreage also is subject to moderate constraints (greater than Alternative A) and 21 percent is subject to major constraints.

Under Alternative D, protection and mitigation to address surface-disturbing activities are the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitats, but also allows mechanized vehicles onto the Raymond Mountain WSA trail. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. As under Alternative A, surface-disturbing activities are avoided in areas of highly erosive, fragile, nonproductive, and (or) excessively steep slopes of 20 percent or greater. Any disturbance in areas with 20 percent or greater slopes will require additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided. Disturbances in these areas require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as under Alternative B.

Direct and indirect adverse impacts to grassland and shrubland communities from surface-disturbing activities under Alternative D are anticipated to be less than under alternatives A and C, but greater than Alternative B, primarily due to the anticipated surface-disturbance acreage.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to provide for human health and safety. In addition, fire-suppression management minimizes the loss of property and threats to other surface owners, such as in areas of high density urban and industrial interface with intermingled BLM-administered lands. It also allows for achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). During suppression activities, soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire, as well as chemical, biological, and mechanical treatments, are used to meet fire and fuels resource management objectives based on acreage thresholds and areas found in an approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Prescribed fire and wildland fire use can be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, similar to Alternative A, which could improve habitats and result in a beneficial impact for grasslands and shrublands.

Livestock and Native Ungulate Grazing. Alternative D is similar to Alternative A, except livestock grazing on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock similar to Alternative A. Protection buffers for placement of salt or mineral supplements are based on resource concerns (i.e., special status plant and wildlife species) on a case-by-case basis. Under Alternative D, direct and indirect adverse impacts to grassland

and shrubland communities from livestock and native ungulate grazing are expected to be similar to Alternative A.

OHV Use. Alternative D closes the second greatest acreage to OHV use. Alternative D opens 159 acres to OHV use, more than alternatives A and B. The soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use are anticipated to produce less indirect and adverse impacts to grasslands and shrublands compared to alternatives A and C.

INNS. Similar to Alternative B, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock supplements. Mixing of chemicals near sensitive resources may be conducted at distances similar to Alternative A. Weed-free seed and forage requirements can indirectly benefit grasslands and shrublands by reducing the potential for establishment and spread of INNS more than under Alternative A with no such requirements.

Proactive Management Actions. Under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources), but these are not as extensive as under Alternative B. Alternative D limits habitat fragmentation by maintaining connections among sagebrush, aspen, and mountain shrub communities, and by maintaining or enhancing large contiguous blocks of these plant communities on BLM-administered land (same as Alternative B). Alternative D provides greater protection to grassland and shrubland communities compared with alternatives A and C, but less protection than provided by Alternative B. Overall, Alternative D is anticipated to result in less adverse impacts to grassland and shrubland communities than alternatives A and C.

4.4.2.3 Conclusion

The impacts from surface-disturbing activities on grassland and shrubland communities are expected to increase as the acreage disturbed increases. Therefore, the alternatives with higher acreage disturbed will result in a greater adverse impact to these communities. The alternatives with lower acreage disturbed will result in lesser adverse impacts when compared to the other alternatives. Meaningful differences in long-term disturbance acreage, reclamation requirements for surface disturbance, management of livestock, OHV use and designations, fire-suppression tactics, and managing for wildlife and special status species in grassland and shrubland communities form the basis for the following conclusion: impacts to grassland and shrubland communities are anticipated to be the least adverse under Alternative B, followed by Alternative D, and the most adverse under alternatives A and C.

4.4.3 Vegetation – Riparian and Wetland Communities

An impact to riparian and wetland areas affects the physical, chemical, or biological components of the ecosystem. Actions that contribute to the decline in abundance, distribution, or functionality of riparian and wetland communities are considered adverse impacts. Conversely, beneficial impacts to riparian and wetland communities are activities that protect or restore these habitat types in the planning area.

Direct impacts to riparian and wetland communities result from disturbing vegetation or ground surface occurring in these communities. Indirect impacts to riparian and wetland communities result from actions within a watershed that cause a change in riparian and wetland functionality (e.g., increased rates of sediment loading or changes in hydrology), a change in water chemistry, and spread of INNS. For the purpose of this analysis, short-term impacts to riparian and wetland communities include actions contributing to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to riparian and wetland communities require more than 5 years to manifest on the ground. Refer to Map 7 for water resources and Map 21 for vegetation.

4.4.3.1 Methods and Assumptions

Evaluating potential impacts to riparian and wetland areas caused by changes in functionality or INNS establishment focuses on resource management actions that (1) cause surface disturbances or limit the

impacts of surface disturbances and (2) are substantially different among the proposed alternatives. Estimates of projected surface disturbances are used as the primary metric for determining the relative level of potential, indirect impacts to riparian and wetland areas.

Methods and assumptions used in this impact analysis include the following:

- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surfaces, changes in water routing, and loss of vegetation.
- Surface disturbances, transportation networks, ungulate use, and recreational activities increase the likelihood of INNS spread in an area.
- It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream and contribute to the loss of riparian and wetland functionality.
- Placing salt and mineral supplements outside of riparian and wetland communities is one way of reducing wildlife and livestock use of riparian and wetland areas.
- Surface runoff to streams generally increases as livestock stocking rates increase. This is not a linear relationship. For example, low stocking rates typically have no measurable impact on surface runoff, moderate stocking rates typically have a negligible impact on surface runoff, high stocking rates have a measurable impact on surface runoff, and consecutive years of high stocking rates have the highest potential for increasing surface runoff to streams.
- Livestock and wildlife use typically is disproportionately higher in riparian and wetland communities than in upland communities. Improper grazing can adversely impact these communities throughout the year, but generally has greater impacts in the spring and early summer, when soils are wet and, therefore, more vulnerable to compaction and stream banks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid-to-late summer). While stocking rates for an allotment or pasture may be low to moderate, the utilization levels in riparian and wetland areas can be high.
- Riparian areas are evaluated during application of the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a).
- Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health. Livestock stocking rates in grazing allotments generally remain unchanged.
- Wildlife can adversely impact riparian and wetland areas depending on how many species, what type, and when the use of the area by wildlife occurs.
- Riparian and wetland areas are able to recharge and rebound faster than other vegetative areas in the planning area.

4.4.3.2 Analysis of Alternatives

Allowable uses and management actions that could impact riparian and wetland communities include surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, INNS, and proactive management actions. Impacts to soil and water, which may

impact riparian and wetland communities, are discussed in the Soil and Water sections earlier in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to riparian and wetland communities because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative, as described under the individual alternatives.

Implementing any of the alternatives may cause direct and (or) indirect impacts; however, no quantification of direct impacts to riparian and wetland areas exist for any of the alternatives. Because the riparian and wetland areas are limited and often the most productive lands, they are disproportionately impacted by humans, livestock, and wildlife compared with the same types or extent of actions in upland areas. Direct impacts to riparian and wetland areas usually are avoided and minimized whenever possible under all alternatives. In general, impacts from projects or uses involving riparian areas are minimized through the application of BMPs.

Changes in water chemistry also can affect riparian and wetland areas primarily through changes in plant species composition, which could impact utilization of the area by wildlife and livestock. Indirect impacts caused by changes in water chemistry historically have not been a major factor in the planning area and are not expected to be in the future.

Usually, the impacts caused by wildlife are less extensive than those caused by livestock, particularly cattle. Elk, deer, and pronghorn are attracted to and often congregate in riparian and wetland areas; however, due to their smaller sizes and foraging habits, they typically do not cause the amount of disturbance that cattle do. In localized areas, elk have substantially impacted riparian habitats through trampling, wallowing, and grazing. Because they can rove across large areas and usually are not confined by fences, big game animals can disperse INNS seed over large areas and into other riparian and wetland habitats. Beaver can dramatically change the nature of a stream and the riparian and wetland areas associated with it. In most cases, the changes to the riparian and wetland areas created by beaver activity are beneficial.

The management of special status species generally involves restricting activities in the vicinity of special status plants or wildlife either year-round or during specific times of the year. As a result, riparian and wetland areas occurring in the vicinity of buffer zones of special status species can benefit from the lower level of public use. Under all alternatives, no water development or salt, mineral, or forage supplements are allowed in areas inhabited by special status plant species or other sensitive areas. This restriction will prevent trampling of plants by livestock. The size of the buffers varies by alternative.

The use of certified weed-free seed mixes and, in some situations, the use of nonnative species could reduce the spread of INNS. Applying rangeland health standards and developing guidelines to maintain or improve riparian and wetland communities is a proactive action applying to all alternatives. The BLM will work with grazing lessees to manage livestock to accomplish this.

Salt cedar is a shrubby INNS and a concern in some riparian and wetland areas because it transpires large amounts of water, resulting in salinization of soil around the plant. This species is a phreatophyte, which is a deep-rooted plant that obtains water from the water table. As a result, salt cedar could exclude native riparian shrubs and herbaceous plants, thereby radically altering wildlife habitats and impacting other functions. Salt cedar is somewhat different from other INNS species in that surface disturbances outside of the riparian zone do not increase salt cedar's ability to invade riparian and wetland areas. In other words, salt cedar is invasive even in areas of low surface disturbance. No management actions under any of the alternatives emphasize the eradication of salt cedar.

Alternative A

Surface-disturbing Activities. In the planning area, the following types of impacts may occur in riparian and wetland communities due to surface-disturbing activities. These types of impacts may occur under all alternatives; however, the intensity of the impacts varies by alternative.

Sediment and water are the two components of streamflow. Sediment inputs into a stream occur naturally due to the process of erosion. Streams and the adjacent riparian and wetland areas evolve over time in response to the amount of water and sediment they carry and (or) receive. A stream system generally is considered stable if the stream is in dynamic equilibrium with its water and sediment inputs. A stream may become unstable if the rate of water or sediment inputs change, such as with an accelerated rate of sedimentation or an increase in water quantity.

Accelerated erosion from uplands and bank erosion increase sediment loading to streams. Typical causes for increased sediment loading into a stream are flashfloods, changes from a relatively undisturbed condition to a more intensive land use in a watershed, surface disturbances in a watershed, improper livestock grazing practices, and wildlife use that alters vegetative cover. Higher sediment loads entering a stream can dramatically alter its form and, consequently, the performance of the riparian and wetland communities adjacent to it. The impact of increased sediment loading depends on the stream's ability to pass the sediment through the system and the size (i.e., disposal volume) of the stream and the channel slope gradient. In segments of a stream that have a lower gradient, deposition occurs and the stream channel aggrades (builds), possibly becoming braided and shallow. In some instances, the aggradations of the streambed at one location can cause the stream to down cut or degrade (become more incised) in upstream reaches as the stream seeks to restore its equilibrium. The additional material eroded from the upstream channel is transported down to the depositional area and the cycle continues. In such cases, the performance of the riparian and wetland areas in both the aggraded stream reach and the incised stream reach change.

Increases or reductions in water quantity also can impact riparian and wetland performance. Prolonged decreases in water quantity (e.g., during times of drought, due to diversions for irrigation, or due to groundwater depletions) can cause a shift in plant species composition in riparian and wetland areas and increase the chances for INNS spread. Typically, plant species that prefer drier conditions do not bind the soil as well as riparian and wetland vegetation and, thereby, can cause a decrease in stream bank stability. Drier conditions also can lead to a decrease in productivity and impact the ability of the riparian area or wetland to support wildlife species.

Increases in surface runoff can have a beneficial impact on riparian and wetland areas because more water may be available for plant growth, thereby increasing plant productivity and abundance. However, increases in surface runoff volumes also can result in an increase in channel incision. This could disconnect the stream from its floodplain (i.e., gully formation). If the stream becomes incised enough, the conditions within associated riparian and wetland areas can become drier and a shift in plant species composition can occur, contributing to bank destabilization and, consequently, to increases in sediment loading.

Changes in surface runoff can occur due to natural or human causes. Natural causes include climatic cycles (e.g., periods of drought or high precipitation) and catastrophic events (e.g., flashfloods, fires, earthquakes, and landslides). Human impacts to surface runoff occur primarily due to land use changes. One of the most prevalent increases in surface runoff caused by human activity is an increase in impervious cover (e.g., roads, parking lots, and rooftops). Roads are not only impervious, they also route water. For this reason, it is undesirable to have a road close to a stream or crossings where runoff from the road is more likely to reach the stream. Improper livestock grazing and sometimes wildlife use also can increase runoff within a watershed due to soil compaction and loss of vegetative cover, with the amount of bare ground being the primary factor (Lusby 1970). Proper livestock grazing can increase vegetative cover and reduce peak runoff quantities to streams and levels of erosion.

Water production from CBNG wells and traditional oil and gas development represents a new water source within a watershed that augments existing water flows. In the event that produced water from CBNG or traditional gas development is disposed of on the surface, riparian and wetland vegetation, as well as the watercourse function, can be affected. The effects can be both beneficial and detrimental, as discussed in the Water Resources section. The loss of vegetative cover from both wildland fires and prescribed fires also can increase runoff and sediment to streams and other water bodies in the short term. A rainstorm following a fire can overwhelm downstream water bodies by contributing excessive amounts of sediment, large woody debris, and water to the system in a short period. Vegetation response after a fire can have beneficial impacts on a watershed by helping to recharge water tables and increasing the amount of herbaceous cover, thereby improving ungulate distribution and lessening erosion.

Under Alternative A, riparian areas are managed to preserve, protect, and restore natural functions. No new permanent facilities are allowed in floodplains, riparian areas, or wetlands, except to benefit watershed health or vegetation. Linear watercourse crossings are considered on a case-by-case basis. Surface-disturbing activities are avoided within 500 feet of riparian areas, 100-year floodplains, wetlands, and aquatic habitats. Outside this buffer area, surface-disturbing activities use existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current standard practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance to reestablish healthy native plant communities based on preexisting composition (where possible) begins within the first available planting period following plugging and (or) drilling operations. If unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. While most surface-disturbing activities will not occur in riparian and wetland areas, these areas may be indirectly impacted due to soil erosion runoff from uplands, causing increases in sediment released into streams.

Under Alternative A, short-term and long-term disturbance acreages from BLM actions are the highest of all alternatives (see Table 4-1). Under Alternative A, the impacts to riparian and wetland communities associated with surface-disturbing activities are mostly indirect impacts and expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include increased sediment into streams and the spread of INNS. Long-term impacts occur beyond 5 years and primarily include loss of habitat acreage due to permanent development.

Fire and Fuels Management. Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources. Use of fire suppression chemicals, including foaming agents and surfactants, and fueling of equipment is not allowed within 200 feet of surface water sources. Although adverse impacts may occur under Alternative A, these restrictions will help to reduce adverse impacts.

Livestock and Native Ungulate Grazing. With proper grazing management and implementation of rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve managing livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long term are expected to continue to improve. On the other hand, improper livestock grazing practices adversely impact riparian and wetland areas through soil compaction and hummocking, physical removal and destruction of vegetation, and trampling of stream banks, causing bank failure. Clary and Kinney (2000) indicate that the damage to riparian habitats because of bank alterations is greater than or equal to the damage caused by changes in vegetation biomass. Livestock grazing in riparian areas can prevent regeneration of woody and herbaceous riparian

vegetation necessary to stabilize stream banks. Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow.

The planning area currently is available for livestock grazing, with the exception of a few small parcels. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements will be implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on category I and maintaining M and C category grazing allotments (see Glossary). Placement of salt and mineral supplements is considered on a site-specific basis under Alternative A. By emphasizing monitoring on higher-priority allotments only (category I, see Glossary), undesirable conditions in lower-priority allotments may not be identified and deterioration may occur or improvement occurring in vegetative communities may not be realized in a timely manner. Adverse impacts to riparian and wetland areas from livestock and native ungulate grazing are anticipated under Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative A, camping is allowed throughout the planning area, which may adversely impact riparian areas and water resources. OHV use disturbs soils and removes vegetation, thus potentially impacting riparian and wetland resources. Current OHV use is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA is designated as closed to OHV use. Linear crossings of watercourses are currently considered on a case-by-case basis. The anticipated soil disturbance, vegetation removal, and transport of INNS from these activities under Alternative A is anticipated to indirectly and adversely impact riparian and wetland resources.

INNS. INNS are particularly undesirable in riparian and wetland areas because nonnative species do not have the same high level of soil-binding properties that many native riparian and wetland species (e.g., willows and sedges) have. INNS, such as salt cedar, can form dense monocultures in riparian areas that block wildlife access to water sources and use more water than native plants. The proximity of surface disturbances to riparian and wetland areas is one of the conditions allowing INNS to spread in these areas. INNS are typically spread through road networks, watercourses and wind, and most easily become established in disturbed areas. Livestock and wildlife also can disperse INNS seed. The interrelationships of livestock grazing, INNS control, and rangeland health are discussed in the Livestock Grazing section of this chapter.

Applying chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact riparian and wetland communities. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation and wetland resources. Aerial application of chemicals is not allowed within 100 feet of open water, vehicle application is not allowed within 25 feet, and hand application is not allowed within 10 feet. Chemicals are mixed a minimum of 500 feet from riparian areas and wetlands.

IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS and can indirectly benefit riparian and wetland resources. The BLM requires outfitters through their approved permit on public lands to use weed free hay, mulch, straw, and cubes, etc. in their operations.

Proactive Management Actions. Management actions that strive to improve streams and conserve riparian and wetland areas generally result in long-term, beneficial impacts to riparian and wetland communities. Under Alternative A, the management of water resources is performed according to existing regulations and with consideration for site-specific conditions. Activity plans are prepared on a case-by-case basis to reduce phosphate, sediment, and salt loading to downstream water bodies. Alternative A also requires avoiding surface-disturbing activities within 500 feet of the 100-year floodplain. These management actions will result in long-term, beneficial impacts to these communities under Alternative A.

Alternative B

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative B due to surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative B, riparian areas are managed for mid- to late-successional stage vegetation. No new permanent facilities, including road crossings, are allowed in floodplains, riparian areas, or wetlands. All linear underground facilities crossing watercourses will be bored on federal projects. Alternative B excludes surface-disturbing activities within ¼ mile of the 100-year floodplain, wetlands, riparian areas, and aquatic habitats. Outside this buffer area, soil surveys and (or) analyses are required for all proposed surface-disturbing activities; however, this alternative prohibits these activities in areas identified as having fragile, chemical and biological crust, nonproductive, or low reclamation potential soil characteristics. Under Alternative B, surface-disturbing activities are prohibited on sensitive or highly erosive soils or on slopes greater than 10 percent unless an adequate soil mitigation proposal is provided. The current NSO restriction for fluid minerals on slopes greater than 40 percent will continue under Alternative B. Unlike under Alternative A, transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities. Under Alternative B, the projected short- and long-term surface disturbances are the lowest of all alternatives, likely providing the most protection for riparian and wetland habitats. Under Alternative B, approximately 50-percent less short-term disturbance and approximately 67-percent less long-term disturbance will be anticipated in the planning area compared to Alternative A.

Under Alternative B, interim reclamation of surface disturbance occurs within the first suitable planting season after the rig is moved off location. Final abandonment of well locations will occur within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related actions, reclamation occurs within the first suitable planting season after operations have ceased. Reclamation standards are developed at the project level. Follow-up seeding and soil nutrient testing requirements are similar to Alternative A. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on preexisting species composition or other species as identified in an approved management plan. Alternative B increases restrictions on habitat fragmentation and protections for special status wildlife and plant species, which benefit riparian and wetland communities that support these species, minimizing the spread of INNS and soil erosion.

Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature as described under Alternative A, but differ in intensity and duration due to the decrease in number of acres disturbed and more stringent reclamation requirements. Based on the acreage of surface disturbance and the management actions implemented to reduce impacts to vegetation systems, Alternative B is anticipated to have the least adverse impacts to riparian and wetland communities of all the alternatives.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire suppression, except under Alternative B, soil disturbances are not allowed within the planning area without consent from the authorized officer. Use of fire-suppression chemicals, including foaming agents and surfactants, are not allowed within 500 feet of surface water sources. Alternative B uses prescribed fire, as well as other treatments, to meet fire and fuels management objectives found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect adverse impacts to riparian and wetland communities from fire and fuels management under Alterative B are expected to be less than under Alternative A.

Livestock and Native Ungulate Grazing. The types of impacts to riparian and wetland communities under Alternative B from livestock grazing are expected to be the same as described under Alternative A, except in intensity. Under Alternative B, the planning area could be available for livestock grazing on a

case-by-case basis where livestock grazing is not in conflict with other resources. No temporary nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coalmines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources. Salt or mineral supplements are located a minimum of ½ mile away from water resources and riparian areas. Placing supplements away from riparian and wetland communities will attract livestock away from these areas, improve livestock distribution in an allotment, and reduce impacts to these communities.

Alternative B generally allows livestock grazing over the same area identified under Alternative A. However, areas identified for the protection of specific resource values would be closed under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including areas that support special status wildlife and plant species. Due to stricter management of livestock grazing, direct and indirect adverse impacts to riparian and wetland resources under Alternative B are expected to be less than under Alternative A and have the least amount of adverse impacts on riparian and wetland communities of all alternatives.

Recreation, OHV Use, and Dispersed Travel. Under Alternative B, riparian areas throughout the planning area are closed to camping. The same types of impacts described under Alternative A from OHV use are expected to occur; however, the extent of these impacts is expected to be less. Under Alternative B, more area would be closed to OHV use (33,896 acres). Motor vehicle travel and OHV use is limited to crowned and ditched roads. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least indirect and adverse impacts to riparian and wetland resources compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile, and vehicle and hand applications are not allowed within ¼ mile, of riparian and wetland areas. Chemicals are mixed a minimum of ¼ mile from riparian areas and wetlands, reducing the possibility of chemical spills into a water system more than for other alternatives. The downside, however, is that because chemical control options are not allowed in riparian systems, the chance of INNS infestation or spread along these watercourses could increase. However, the use of biological and mechanical means to control INNS in riparian systems remains an option. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS and can indirectly benefit riparian and wetland resources. In addition to this requirement, Alternative B requires the use of certified weed-free forage and feeds for livestock supplements to prevent the establishment of new weed areas.

The greater the distance from riparian areas and wetlands that chemicals are applied or mixed, the lesser the potential for impacts associated with vegetation removal, soil disturbances, or chemical spills. Therefore, direct and indirect impacts to riparian and wetland resources associated with application of INNS control methods will be less for Alternative B than Alternative A. There is, however, an increased chance that INNS may be able to infest or spread through riparian areas with fewer control options available. Requiring the use of certified weed-free forage and feed to prevent the establishment of new weed areas will indirectly benefit riparian vegetation and wetland resources.

Proactive Management Actions. Under Alternative B, activity and (or) project plans are prepared to reduce phosphate, sediment, and salt loading to downstream water bodies, including Bear Lake and the Flaming Gorge Reservoir. Disposal of produced water to waters or streams is prohibited. Alternative B also prohibits surface-disturbing activities within ¼ mile of the 100-year floodplain, wetlands, riparian areas, and perennial streams. Alternative B implements more protective measures than the other

alternatives for riparian, wetland, and surface water areas from fire suppression, INNS control, and recreational activities, and has the least adverse impacts due to these activities of all the alternatives. Alternative B also provides the greatest area within BLM-administered lands that will be given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources). The beneficial impacts for wetlands and riparian areas under Alternative B are the greatest of all alternatives.

Alternative C

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative C related to surface-disturbing activities are expected to be slightly less than those for Alternative A. Under Alternative C, riparian areas are managed similarly to Alternative A; however, new permanent facilities are allowed in floodplains, riparian areas, or wetlands, provided there are no practicable alternatives and sufficient mitigation is undertaken so that the action will meet the requirements of Executive Orders (EOs) 11988 and 11900. Linear watercourse crossings are considered on a case-by-case basis (same as Alternative A). Avoidance of surface-disturbing activities in riparian areas, 100-year floodplains, wetlands, and aquatic habitats are the same as under Alternative A.

Under Alternative C, the projected short- and long-term surface disturbances from BLM actions are the second highest of all alternatives. Under Alternative C, there are approximately 41,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources and protection and mitigation to address these activities. Also, transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under the alternative. Restrictions to oil- and gas-related activities and reclamation of surface disturbance requirements are similar to Alternative A. Reclamation of surface disturbance is the same as Alternative A. Direct and indirect adverse impacts to riparian and wetland resources from surface-disturbing activities under Alternative C are anticipated to be similar or slightly less than under Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed from heavy equipment during fire suppression unless private or public habitable structures or industrial facilities are at risk. Use of fire-suppression chemicals, including foaming agents and surfactants, is allowed in the planning area. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment some direct impacts are reduced. However, by not restricting fire-suppression chemicals, and not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to the health of riparian and wetland resources.

Livestock and Native Ungulate Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows is available for livestock grazing. Grazing system and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guidelines) other resource values. The placement of salt and mineral supplements is managed similar to Alternative A. Due to greater emphasis on livestock values under Alternative C, impacts to riparian and wetland resources are expected to be greater than Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative C, camping is allowed throughout the planning area (same as Alternative A), which often affects riparian areas. Also under Alternative C, the number of acres closed to OHV use is the same as Alternative A. All existing roads and trails are open to motor vehicle and OHV use in the planning area, except in the Raymond Mountain WSA. Limited off-trail travel also is allowed to perform specific tasks, including surveying, maintenance, weed spraying, and fence repair. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHVs

under Alternative C are anticipated to produce less indirect and adverse impacts to riparian and wetland resources compared to Alternative A.

INNS. BLM management for INNS under Alternative C is the same as Alternative A, except that chemicals may be mixed at a minimum of 100 feet (less distance than Alternative A) from sensitive water resources, including riparian vegetation and wetlands. The lesser the distance from sensitive resources that chemicals are mixed, the greater the potential for spills to adversely impact these areas. In addition, Alternative C recommends the use of certified weed-free seed and mulch and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, which can indirectly benefit riparian and wetland resources.

Proactive Management Actions. Under Alternative C, activity and (or) project plans are prepared to reduce phosphate, sediment, and salt loading to downstream water bodies and are developed similar to Alternative A. Avoidance areas for surface-disturbing activities also are similar to Alternative A. Under Alternative C, prescribed fire, wildland fire use, and chemical, mechanical, and biological treatments could be used to meet vegetation management resource objectives. Under Alternative C, no areas within BLM-administered lands are given special designation for protection of sensitive resources. Alternative C provides the least protection of riparian and wetland resources when compared to the other alternatives.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative D for surface-disturbing activities are expected to be the similar to those described under Alternative A. Under Alternative D, riparian areas are maintained, improved, or restored to enhance habitat forage conditions for wildlife and livestock and improve stream water quality. Riparian areas are managed with sensitive wildlife and plant species concerns to a successional stage appropriate for the benefit of those species, including vertical as well as horizontal vegetative structure and composition. No new permanent facilities are allowed in riparian areas or wetlands unless (1) they meet the requirements and intent of EOs 11988 and 11990, (2) there are no practicable alternatives, and (3) appropriate mitigation measures are implemented. Linear watercourse crossings are considered on a case-by-case basis (same as Alternative A). Avoidance of surface-disturbing activities in riparian and wetland areas is similar to Alternative A.

Short- and long-term disturbance from BLM actions for Alternative D are the second lowest of all alternatives. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil and gas leasing consideration (slightly less than Alternative A), all of which are subject to the terms and conditions of the standard lease form. Approximately 75 percent of the acreage also is subject to moderate constraints (greater then Alternative A) and 21 percent are subject to major constraints.

Under Alternative D, protection of riparian and wetland areas and mitigation to address surface-disturbing activities is the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitat areas. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil- and gas-related activities are restricted on slopes greater than 25 percent and NSO restrictions for fluid minerals are implemented for slopes greater than 40 percent, as in Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater, and any disturbance in areas with 20 percent or greater slopes requires additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided and require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as Alternative B. Direct and indirect adverse impacts to

riparian and wetland resources from surface-disturbing activities under Alternative D are anticipated to be less than under alternatives A and C, but greater than Alternative B.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows an AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to first provide for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high-density urban or industrial interface with intermingled BLM-administered lands, but also for allowing achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). During suppression activities, soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Use of fire-suppression chemicals is managed similar to Alternative A. The use of prescribed fire, as well as chemical, biological, and mechanical vegetation treatments, is similar to Alternative B based on acreage thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). Therefore, impacts to wetlands and riparian areas under this alternative have similarities to both alternatives A and B.

Livestock and Native Ungulate Grazing. Alternative D is similar to Alternative A, except livestock grazing on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Salt or mineral supplements are located a minimum of ¼ mile from water resources and riparian areas. Under Alternative D, direct and indirect adverse impacts to riparian and wetland resources are expected to be similar to Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative D, only dispersed camping is allowed within 200 feet of a water source, except where developed camping facilities currently exist. The Pine Creek Canyon riparian conditions are monitored; camping will be relocated away from areas where resource damage is occurring. Alternative D closes more acres to OHV use than alternatives A and C, but less than Alternative B. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHVs under Alternative D are anticipated to produce less indirect and adverse impacts to riparian and wetland areas compared to Alternative A.

INNS. Alternative D is similar to Alternative A, except that Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas (same as Alternative B). Mixing of chemicals near sensitive resources may be conducted at distances similar to Alternative A. These management actions can indirectly benefit riparian vegetation and wetlands more than Alternative A by reducing the potential for establishment and spread of INNS and decreasing spills that reach waterways.

Proactive Management Actions. Under Alternative D, activity and (or) project plans prepared to reduce phosphate, sediment, and salt loading to downstream water bodies are designed similar to Alternative B. Under Alternative D, prohibition of surface-disturbing activities is similar to Alternative A. Under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources), but these would not be as extensive as Alternative B. Alternative D provides greater protection to riparian and wetland resources when compared to alternatives A and C, but less protection than the maximum provided by Alternative B.

4.4.3.3 Conclusion

The following conclusion is based on differences in short- and long-term disturbance acreage; reclamation requirements for surface disturbance; management of livestock, including placement of supplements; recreational and OHV use designations; fire suppression and INNS control tactics; and managing for wildlife and special status species: impacts to riparian and wetland communities are

anticipated to be the least adverse under Alternative B, followed by Alternative D, and the most adverse under alternatives A and C.

4.4.4 Fish and Wildlife Resources – Fish

Actions that could occur through implementing each alternative could affect fish resources. This section describes the impacts of each alternative on fish resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

Both natural events and human activities that influence water quality and water quantity can produce beneficial or adverse impacts to fisheries habitats. Direct impacts can result from onsite disturbance to fisheries habitats and indirect impacts can result from changes in water quality and quantity. Management actions that increase rates at which sediment is transported to and through streams increase deposition within the streams and could adversely impact fish. Refer to Appendix M for data regarding surface-disturbance acreage and the number of actions by alternative. Refer to Map 7 for water resources in the planning area.

In addition to their ecological importance, fish are a valuable resource for humans. Management actions that impact access to this resource for recreational use by the public would be a direct impact on fisheries management.

4.4.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Activities that cause substantial disturbance to soils and vegetation may adversely impact water quality and quantity, which would adversely impact fisheries habitats.
- Surface disturbances can result in accelerated runoff and sediment delivery to stream channels, which can alter streamflows and reduce habitat quality for fish that require clear water, moderated streamflows, and clean substrates.
- Increased sedimentation adversely impacts most fish species in the planning area. This analysis, therefore, focuses on the degree of surface disturbance anticipated to occur under each alternative.
- Activities affecting water quantity are regulated by the Wyoming State Engineer's Office.
- Activities affecting water quality are regulated by the Wyoming DEQ.
- Designation of ACECs for special status fish species generally improves water quality for all fish species.
- The potential for sedimentation of streams and rivers is minimized through using BMPs.

4.4.4.2 Analysis of Alternatives

Allowable uses and management potentially impacting fish include all surface-disturbing activities, concentrated livestock and native ungulate grazing, OHV use, fire and fuels management, wind-energy development, and proactive management actions. Potential impacts to fisheries generally occur in two categories—water quality and water quantity—due to the limited number of fish-bearing stream segments occurring on public lands. These categories serve to organize the description of potential impacts for each alternative.

Impacts Common to All Alternatives

The types of impacts projected to occur to fish because of the various alternatives are similar; however, the intensity of impacts varies by alternative. Impacts to water quality and quantity are described in

general below and in more detail in the Water section in this chapter. Impacts to fish from changes in water quality and water quantity are described under individual alternatives.

Water Quality Impacts

Under all alternatives, fisheries resources could be impacted by resource management actions that alter water quality through sedimentation and related degradation from surface-disturbing activities, water temperature changes, water chemistry changes, and riparian management and restoration.

Sedimentation of streams and rivers could be caused by any surface disturbance that removes vegetation and loosens the surface soil, which ultimately is deposited in streams and rivers. The amount of sediment that reaches streams and rivers depends on many factors, including slope gradient, soil type, sediment control measures, distance from the disturbance to the channel, and the type and amount of vegetative cover. The highest potential for surface disturbance under all alternatives is anticipated from BLM actions in fire and fuels management, mineral development, wind-energy development, powerlines, and vegetation treatments (Appendix M). Soil disturbance also could result from forest management activities, OHV use, livestock grazing, and the reclamation of disturbed areas.

Livestock and wildlife grazing can increase sediment entering streams from animal concentration areas, the collapsing of banks, stream-channel alteration, and removal of vegetation in riparian areas. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Soil disturbance from livestock grazing is minimized through implementing the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) under all alternatives. In addition, salt, mineral, and other livestock supplements near riparian areas, wetlands, and other waters could adversely impact water quality.

Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to naturally reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also result from changes in the amount of vegetative cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions. Changes in water chemistry result from fire and fuels management and the use of retardant or foam near riparian areas and water sources.

Water Quantity Impacts

Water quantity may be impacted by activities that alter water runoff and water disposal. In areas with little vegetation, more rainfall may reach the stream systems because it does not infiltrate the soil. However, greater runoff can cause accelerated erosion and increased sediment loading in streams. Impervious surfaces and compacted soils may result in higher volumes of water reaching the stream system in shorter periods, thus increasing flooding frequency, volume, and erosion.

Oil and gas developments require anywhere from between 2 to 5 acre feet of water withdrawal in order to drill and complete the well location. These waters are typically withdrawn from either a local water well, stream or municipality (which draws waters from a specific water way). In addition, lower waters may exasperate the impacts of sedimentation, salt and other impacts and needs to be identified within both the quantity and quality sections of the document.

Alternative A

Water Quality Impacts

Compared to the Action Alternatives, Alternative A allows the second greatest acreage of federal mineral estate (261,564 acres) administratively available to oil and gas and other leasables with standard constraints. Some of this development is projected to occur in areas that drain into Class 1 or 2 streams.

The State of Wyoming requires an antidegradation policy for Class 1 streams, whereas Class 2 streams require that the designated uses be sustained.

Alternative A provides for preserving the natural functions of riparian areas by avoiding surface-disturbing activities within 500 feet of wetlands, riparian areas, aquatic habitats, and 100-year floodplains. Other activities proposed under Alternative A that could result in surface disturbance and contribute to sedimentation include OHV use, the mining of coal, trona, and salable and locatable minerals, the development of wind-energy sites, and forest management. For example, Alternative A designates the smallest acreage closed to OHV use and the second highest acreage with seasonal closures. As such, some degree of unauthorized road proliferation would continue, which could contribute sedimentation to surface water bodies. Structures associated with road and trail construction could intercept surface water runoff and divert sediment to the stream systems. No decisions are made under Alternative A regarding wind-energy development. Increased sedimentation resulting from the activities identified above would likely impact fisheries habitats within the planning area under Alternative A. No new ACECs are designated under Alternative A to protect fisheries habitats; however, the Raymond Mountain ACEC designated under Alternative A addresses Bonneville cutthroat trout habitats, thereby potentially benefiting other fisheries habitats. Alternative A manages 13 eligible waterway segments to protect the free-flowing values and tentative classification of these waterway segments as wild and scenic rivers. If produced water from well-drilling operations were to be disposed to surface waters, increased rates of erosion and entrainment of salts and sediment into the water column may occur, as could secondary degradation of water quality.

Water Quantity Impacts

Alternative A imposes the second fewest restrictions on activities that remove vegetation and compact soils. This would result in increased storm water runoff entering streams. This alternative is projected to have the second highest number of federal wells drilled (1,012 wells). Although the potential for CBNG is limited in the planning area, produced water from these types of wells could impact water quantity. The disposal of this water is subject to local, state, and federal laws and regulations. Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or surface disposal. Disposal of produced water to surface waters could affect surface water quantity; however, there are currently no surface disposals of produced water to surface waters within the Kemmerer planning area (Roberts 2006).

Produced water from CBNG wells and other oil and gas wells can be authorized for disposal under Onshore Order No. 7 contributing additional flows to the surface water system. However, water disposal must comply with Wyoming DEQ and the Colorado Salinity Compact requirements. These disposals can alter the timing, location, and volume of local streamflow patterns. Produced water disposal also can increase erosion rates in stream channels along with instream flows and augment sedimentation in streams. However, BLM policies and BMPs, required as conditions of approval, minimize and mitigate, to the extent possible, erosion resulting from produced water surface disposal. Aquatic species may be impacted by produced water disposal to the surface, especially during periods of low flow and spawning. The volume of surface water disposal and the channel capacity of the receiving stream determine the change, if any, to stream characteristics. Because disposal water must meet DEQ water quality standards, the quantity of produced water, if disposed, is anticipated to be similar to existing surface waters and have negligible direct beneficial or adverse impacts. If the disposed water causes increased rates of erosion and entrainment of salts and sediment into the water column, then secondary degradation of water quality could occur.

Alternative A does not actively address human-caused barriers to fish movement. However, the Gold Book standards for culvert installation do address proper culvert installation for streams.

Alternative B

Water Quality Impacts

Alternative B proposes less surface disturbance over the long term compared with Alternative A and the least of all alternatives. Compared to Alternative A, fewer opportunities exist for surface-disturbing activities, including oil and gas development, roads, powerlines, and vegetation treatments. Alternative B implements more restrictions than Alternative A, including closing areas within ¼ mile of wetland riparian areas and perennial streams to surface-disturbing activities to reduce channel and bank erosion and sediment loading. Alternative B restrictions on surface-disturbing activities and the prohibition of discharging produced waters to streams are expected to result in the least adverse impacts to Class 1 and 2 streams relative to Alternative A and other action alternatives. In addition, Alternative B has the least amount of acreage suitable for wind-energy development of all alternatives.

Under this alternative, the Dry Fork, Upper Tributary, and Lower Tributary watersheds are designated ACECs to protect special status fish species (see Special Status Species – Fish section of this chapter). These designations generally result in greater beneficial impacts on water quality in those areas than Alternative A, which does not designate these areas as ACECs. Alternative B recommends the 13 eligible waterways for inclusion in the national wild and scenic rivers system, an action anticipated to improve water quality and, thus, beneficially impact fisheries in the planning area.

Adverse impacts to water quality from OHV use are expected to be less under Alternative B than under Alternative A. Alternative B provides more effective management of motorized use to sensitive areas and decreases environmental impacts from motor vehicle use compared to Alternative A. Alternative B includes a greater degree of improved management directed at protecting erosive soils than Alternative A. With the most area closed to OHV use and the most area with seasonal closures for OHV use, Alternative B is anticipated to result in the least adverse impacts to water quality compared to Alternative A and the other action alternatives. Alternative B has more stringent requirements to protect soils from surface-disturbing activities resulting in fewer opportunities for soil erosion and sedimentation. The restrictions on surface-disturbing activities under Alternative B, along with proposed actions to manage for late successional stage riparian vegetation, reduce adverse impacts to water quality and fish habitats compared to Alternative A and benefit fisheries in the planning area.

Water Quantity Impacts

Alternative B results in the least amount of change to surface water quantity because the fewest federal wells are drilled (608 wells), disposal of produced waters to streams is prohibited, and more restrictions on surface-disturbing activities are implemented than under Alternative A or the other action alternatives. Alternative B's management of human-caused barriers to fish movement, including, but not limited to irrigation diversions, road crossings, and damaged culverts, results in greater beneficial impacts to fish species than Alternative A by providing for genetic diversity and population stability.

Alternative C

Water Quality Impacts

Alternative C has the most potential of all alternatives to degrade water quality through increased sedimentation due to having the least restrictions on surface-disturbing activities. Alternative C is expected to produce the second greatest amount of short-term surface disturbance of all alternatives. Alternative C opens the most acres and closes the least acres to OHV use and has the second-most acres administratively available to mineral leasing with standard stipulations. In addition, Alternative C has the greatest acreage suitable for wind-energy development. Alternative C's proposed restrictions and reclamation requirements are anticipated to result in similar adverse impacts to water quality as Alternative A.

Alternative C does not designate any areas as ACECs to protect fisheries habitats and removes the Raymond Mountain ACEC. The lack of specific protections for watersheds results in similar beneficial impacts to fisheries habitats as Alternative A.

Water Quantity Impacts

Alternative C results in a similar, but slightly greater amount of change to surface water quantity because the most federal wells are drilled (1,020 wells) and disposal of produced water is allowed providing it meets local, state, and federal laws and regulations, similar to Alternative A. Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or surface disposal. Disposal of produced water to surface waters could affect surface water quantity; however, there are currently no surface disposals of produced water to surface waters within the Kemmerer planning area (Roberts 2006).

Under Alternative C, impacts from CBNG wells and other oil and gas wells are similar to Alternative A. Human-caused barriers to fish movement are managed similar to Alternative A, resulting in similar impacts..

Alternative D (Preferred Alternative)

Water Quality Impacts

Alternative D has the second lowest acreage administratively available to mineral leasing with standard stipulations and the highest acreage administratively available with moderate constraints. OHV use restrictions are similar to those described under Alternative B, but a larger area (159 acres) is open to OHV use under Alternative D, so the potential for surface disturbance and sedimentation from OHV use is slightly greater. Alternative D implements restrictions similar to Alternative B, but greater than Alternative A, to protect water quality, including designing surface-disturbing activities to reduce channel and bank erosion and sediment loading. However, Alternative D results in the second highest acreage suitable for wind-energy development. The anticipated adverse impacts to water quality for Alternative D are anticipated to be less than Alternative A, but greater than Alternative B.

Alternative D retains the Raymond Mountain ACEC and recommends two waterways, Huff Creek and Raymond Creek, for inclusion in the national wild and scenic rivers system. These designations may benefit fisheries in general and provide more management direction to protect existing resource values than Alternative A. This type of management results in greater beneficial impacts to fisheries habitats than Alternative A.

Water Quantity Impacts

Although the number of federal wells (1,010 wells) drilled under Alternative D is similar to Alternative A (1,012 wells), Alternative D results in fewer adverse impacts to fish habitats because Alternative D implements more restrictions by requiring a BLM-approved produced water disposal plan. Impacts to fish species based on management of human-caused barriers to fish movement under Alternative D are the same as Alternative B.

4.4.4.3 Conclusion

Alternatives A and C have the greatest potential of adverse impacts to fisheries because these alternatives have the largest areas administratively available to mineral development and the least restrictions on surface-disturbing activities. Alternative B results in the least potential adverse impacts to fisheries habitats due to more restrictions on surface-disturbing activities. Compared to Alternative A, limitations on surface disturbance and mineral development under Alternative B potentially lessen degradation of water quality. Alternatives B and D provide more effective management of motorized use in sensitive areas and decrease environmental impacts from motor vehicle use. Alternatives A and C have the greatest potential for user conflicts and degradation of natural resources. The designation of three ACECs

under Alternative B to protect special status fish species is anticipated to have greater beneficial impacts to fisheries habitats than any other alternative.

4.4.5 Fish and Wildlife Resources – Wildlife

Actions that remove, degrade, or fragment wildlife habitat are considered adverse. Beneficial impacts include actions that conserve or improve habitats, such as big game crucial winter range, nest sites, or leks.

Direct impacts to wildlife could result from the loss of habitats or key habitat features, such as a nest site or lek area, or from the immediate loss of life. Wildlife also can be directly disturbed by human activities, potentially causing wildlife to abandon a nest, lek, or home range. Disturbance during sensitive periods (e.g., winter, nesting) is known to adversely impact wildlife. Human activities, such as OHV use, recreation, and noise from equipment associated with development and surface-disturbing activities, impact some wildlife species. These activities are considered to be particularly detrimental to nesting and lekking grouse, nesting raptors, and wintering big game. Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment of home range (Yarmaloy et al. 1988; Miller et al. 1998; Connelly et al. 2000).

Habitats can be lost and fragmented by activities such as vegetation treatments; fire and fuels management; mineral exploration and extraction; construction and maintenance of roads and trails; and development of wind-energy facilities. Indirect impacts to wildlife can occur by changing habitat characteristics or quality. Habitat quality can be impacted by various surface-disturbing activities and other actions that remove vegetation and disturb soil. Indirect impacts to wildlife habitats also could occur when specific actions change the habitats in a way that would make it unsuitable for future habitation. Human disturbance from vehicular travel on roads, human activity at drill sites or wellheads, or any other activity not associated with the natural environment (including noise from generators) can indirectly impact wildlife not accustomed to it. Two species especially sensitive to human activity and noise include greater sage-grouse on lek sites and elk.

For the purpose of this analysis, short-term impacts to wildlife are activities that an individual or species respond to immediately, but do not affect the population viability of the species. For example, many disturbance impacts are short term in that a species may temporarily abandon an area, nest, or lek, but return immediately following the cessation of the disturbance, such as a passing OHV. Short-term construction may cause an animal to abandon an area, nest, or lek, but the species is often able to return to the area and reproduce successfully the following season. Refer to Map 21 for vegetation and to Map 22 for crucial big game winter range.

4.4.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- BLM, in cooperation with state and other federal wildlife agencies, is responsible for managing habitat (e.g., quality, suitability, usability), whereas state and federal wildlife management agencies (e.g., WGFD, USFWS) have primary authority for overseeing management of wildlife populations. Therefore, this analysis primarily relies on vegetation changes and loss of habitat use due to disruptive activities to estimate impacts to wildlife habitats.
- For each alternative, changes to vegetation types, in either quantity, quality, or increased fragmentation, are compared to baseline conditions. Adverse and beneficial impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding adverse or beneficial impact on wildlife species.
- Disturbance impacts to wildlife are evaluated by comparison to current management practices in the planning area; increased protection in time or space is beneficial, while reduced protection has adverse impacts.

- High-quality habitats foster healthy, abundant, and biological communities appropriate to those habitats.
- Human activity that disturbs wildlife during sensitive periods causes adverse impacts.
- Habitat fragmentation adversely impacts many desired species of wildlife.
- The BLM authorizes livestock grazing only on BLM-administered surface lands, but through the AMP process can manage nonfederal lands when given permission by the landowner.
- Impact-acre estimates are based on the best, currently available information.
- Management actions aimed to benefit specific wildlife species can have adverse or beneficial impacts on other wildlife species.
- Generally, the more acreage of habitat protected from fragmentation, the greater the benefit to big game and other desirable wildlife species.
- "Prohibit" means specified activities or impacts to wildlife during identified periods or in designated habitat areas would not occur unless specific biological exception criteria are met.
- Surface disturbance generally causes adverse impacts to desired wildlife habitats. Lesser amounts of surface disturbance in wildlife habitats have a corresponding lesser adverse impact to wildlife compared to more surface-disturbing activities.
- When surface disturbance is later reclaimed, it is accounted for in surface-disturbance acreage in Appendix M.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protection than avoiding surface disturbance or occupancy.
- Concerning the analysis of impacts on raptor nests, all known nests from the BLM's GIS database are used in the analysis and all raptor nests of unknown species are assumed to not be special status species.
- The exact locations of future surface-disturbing activities cannot be predicted. Therefore, for analysis purposes, surface-disturbing activities are assumed to occur in vegetation types in proportion to their availability within the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- The BLM utilizes best available information, management and conservation plans, and other research and related directives, as appropriate, to guide wildlife habitat management on BLM-administered lands.

4.4.5.2 Analysis of Alternatives

Allowable uses and management actions that could impact wildlife habitats include all surface-disturbing activities, concentrated livestock grazing, fire and fuels management, forest management, INNS, OHV use, recreation, transportation, and proactive management actions.

Impacts Common to All Alternatives

The impacts projected to occur to wildlife as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to wildlife from surface-disturbing activities, concentrated livestock grazing, fire and fuels management, forest management, INNS, OHV use, recreation, transportation, and proactive management actions are described under individual alternatives. For organization purposes, impacts to wildlife from alternatives generally are grouped into categories of surface-disturbing activities, wildlife-disturbing activities that remove

vegetation and disturb soil, spread of INNS, transportation, and proactive management actions anticipated to impact wildlife. The impacts described for each alternative are organized according to the statutory wildlife categories described in the Fish and Wildlife Resources – Wildlife section in Chapter 3.

Refer to Table 4-1 for the anticipated short- and long-term surface disturbance acreages from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M. Because the precise location of foreseeable actions in the planning area is not known at this time, Table 4-1 and associated types of development were used to estimate the relative impact of alternatives on statutory categories of wildlife.

Animal damage control typically applies to coyote, red fox, and skunk. No difference in adverse impacts to predatory animals is anticipated across alternatives.

Potential impacts to wildlife species are anticipated from surface-disturbing activities, wildlife-disturbing activities (i.e., those activities that remove vegetation and disturb soil and [or] human activities that result in disturbance because of presence), spread of INNS, and proactive management actions. Although lumped for discussion purposes, under surface disturbance, oil and gas development is anticipated to be the greatest single contributor to disturbance of wildlife habitat in the planning area. The WGFD (2004a) provides a more thorough discussion of the impacts of oil and gas development on crucial and important wildlife habitats. At various intensities, the actions of all alternatives could adversely impact wildlife through the loss, degradation, and fragmentation of habitats, and benefit wildlife through the protection, enhancement, and restoration of habitats. Potential impacts from each category of activities are described below as they apply to all alternatives and to all statutory wildlife categories.

Surface-disturbing Activities. Because the precise location of surface disturbance from alternatives is unknown and because wildlife species utilize more than one vegetation type, the degrees of impacts to wildlife from surface disturbance are anticipated to be directly related to the amount of surface disturbance. Long-term acreage calculations account for those areas where reclamation practices have not been completed in order for the placement of facilities, temporary or permanent (e.g., roads, well pads, wind turbines, etc.), in order to stabilize unnecessary portion of the disturbance. The goal of this reclamation is to improve soil stability, and soil health. An additional benefit is that it may provide forage for livestock and some wildlife species. However, the long term impact to some species that require specific habitat types (i.e. sage obligates) may experience habitat impacts throughout the life of the facilities and for years after the facility removal. The higher the density of permanent facilities in an area, the more a habitat is fragmented and the more adverse impact anticipated for wildlife (Weller et al. 2002). Table 4-9 summarizes select conservation measures anticipated to offset some of the impacts to habitats.

In addition to temporarily or permanently removing wildlife habitats, surface disturbance can degrade the quality of adjacent habitats. For example, erosion and runoff from surface disturbance can extend onto adjacent habitats, thereby causing additional soil erosion. Moreover, dust from surface disturbance can cover adjacent vegetation, thereby reducing photosynthesis and (or) the palatability of vegetation. Depending on the intensity of degradation, season, and the health conditions of wildlife using the habitats, reductions in habitat quality can have short- and long-term impacts to wildlife. For example, Towry (1984) indicates that deficiencies in summer range-habitat quality can lead to mortality of wildlife in the winter and reduce reproductive success in mule deer.

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Raptors – ½-mile buffer	BLM-Administered Surface	3,769	0	3,769	0
	BLM-Administered Mineral Estate	3,065	0	3,065	0
Raptors – ¾-mile buffer	BLM-Administered Surface	37,689	0	37,689	37,689
	BLM-Administered Mineral Estate	40,878	0	40,878	40,878
Raptors – 1-mile buffer	BLM-Administered Surface	74,599	0	74,599	74,599
	BLM-Administered Mineral Estate	71,531	0	71,531	71,531
Raptors – 1½-mile buffer	BLM-Administered Surface	0	245,978	0	0
	BLM-Administered Mineral Estate	0	249,154	0	0
Acres Closed to Travel Management	BLM-Administered Surface	32,787	33,896	32,787	33,037
Acres Open to Travel Management	BLM-Administered Surface	0	0	2,791	159
Acres Designated to Travel Management	BLM-Administered Surface	0	0	0	4,506
Acres with Seasonal Closures for Travel Management	BLM-Administered Surface	287,160	599,175	0	287,160
Vegetation Management	BLM-Administered Surface	Complies with ESA and BLM policy	Maintains large blocks of mountain scrub, aspen, and sagebrush communities	Same as Alternative A	Same as Alternative B
Habitat Fragmentation	BLM-Administered Surface	NA	Avoided to no more than 3 percent of available habitats	Avoided	Avoided
Migration Corridors	BLM-Administered Surface	NA	Identify and preserve	Identify and develop management	Identify and collaboratively develop management

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife *(Continued)*

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Use of certified weed-free forage and feeds	BLM-Administered Surface	NA	Required	Recommended	Required
Use of certified weed-free seed and mulch	BLM-Administered Surface	NA	Required	Recommended	Required
Acres of forestland and woodland treated annually	BLM-Administered Surface	NA/NA	50/50	150/100	75/75
Big Game Crucial Winter Range Closure	BLM-Administered Surface	January 1 to April 30 in Slate Creek, Rock Creek, and Bridger Creek	November 15 to April 30 annually	None	Same as Alternative A

BLM Bureau of Land Management
ESA Endangered Species Act
NA not applicable

Surface-disturbing actions typically require BMPs to avoid or minimize impacts to soil resources and, ultimately, to habitats. Temporary protective surface treatments can benefit reclamation of habitats on steep slopes or on soils with high potentials for water or wind erosion because these areas are more difficult and often take more time to reclaim compared to other areas. Once surface disturbance occurs, timely reclamation is important to avoid or minimize soil erosion and the spread of INNS. The longer reclamation takes, the greater the adverse impact is to habitats and wildlife species.

Management of runoff from roads and other impervious surfaces or disturbed areas is an example of impacts from surface disturbance that can be short-term and long-term. Multiple disturbances on steep slopes or highly erosive soils are anticipated to exacerbate habitat degradation by soil erosion and runoff into wildlife habitats. This also may reduce reclamation potential to restore the habitats.

Vegetation treatments, such as silviculture, are used to manage forests that can, in turn, impact wildlife habitats. McAninch et al. (1984) observe that forest clear-cuts alter wildlife habitats more than other silviculture treatments because they set back plant succession to an early stage, disturb soil, alter microclimatic conditions, and completely remove forest habitats.

Roads remove vegetation and disturb soil when they are constructed and thereafter. Forman et al. (2003) identify mortality, habitat loss, and reduced habitat connectivity as the three impacts roads have on wildlife. Mortality of wildlife and loss of habitats due to road construction are direct impacts; vehicle speed and traffic volume have generally increased the mortality of wildlife due to vehicle collisions (Forman et al. 2003).

Road construction also causes habitat loss by converting wildlife habitats to permanent road surfaces and ROW (Forman et al. 2003). In addition, because roads typically are void of vegetation and exhibit impervious surface or compacted soil, they often promote increased surface runoff and lead to soil erosion and transport of pollutants to nearby streams, wetlands, or riparian areas.

In addition to direct impacts, roads also contribute to habitat fragmentation and can establish barriers to some wildlife species. For example, Towry (1984) indicates that roads generally decrease habitat quality for mule deer for a distance of ½ mile on either side of the road. Forman et al. (2003) acknowledge that buffer areas around roads generally are avoided by ungulates and large carnivores. Forman et al. (2003) also identify two wildlife responses to roads and their associated disturbances: numerical responses and behavioral responses. Numerical responses pertain to reductions in wildlife abundance or density;

behavioral responses pertain to wildlife that has learned to avoid roads. While the impacts identified are considered adverse, roads also can create beneficial impacts to wildlife. For example, exclusion fencing along roads can increase the amount of forage available to small mammals (Forman et al. 2003).

In addition to roads, ROW and corridors occur in the planning area under all alternatives and impact wildlife in varying ways. For example, utility poles benefit raptors and other birds by providing perching or nesting structures; however, these same utility structures also can cause mortality in raptors through electrocution and collisions (USFWS 2002). These utility structures also can be a detriment to raptor prey species because they provide a place from which raptors can hunt that gives them an unnatural advantage over sage steppe species that evolved in open habitats devoid of such structures. In addition to raptors, other species, such as ravens, crows, magpies, small flocking birds, and wading birds, are subject to electrocution by utility structures (USFWS 2002). Erecting artificial nest platforms on utility structures may benefit birds, such as osprey, eagles, and hawks, and nest boxes constructed on utility structures may benefit cavity-nesting birds (e.g., bluebirds) and bats (USFWS 2002). However, these structures also can have an unnatural adverse impact to potential prey species.

Wildlife-disturbing Activities. Planned and unplanned wildland fire removes vegetation and disturbs soils. Although wildland fire adversely impacts certain desirable wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years.

Fire suppression removes vegetation and disturbs soil, and can have both short- and long-term impacts to big game and other habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of INNS, thereby resulting in long-term adverse impacts to certain desirable wildlife habitats. Timely stabilization and rehabilitation following fire, therefore, is important to maintaining the quality of wildlife habitats.

Wildland fire has beneficial and adverse impacts to wildlife habitats. For example, fuels tend to build under repeated fire suppression, sometimes resulting in intense wildland fires that can cause long-term adverse impacts to certain desirable wildlife habitats. Repeated fire suppression in forests also can result in encroachment of fire-induced wildlife habitats (Wishart 1980). On the other hand, wildland fire can improve the quality of certain desirable wildlife habitats by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats. Preparing wildland fire use plans and coordinating with adjacent landowners prior to prescribed or wildland fires can provide opportunities for taking advantage of the benefits wildland fire can provide to certain desirable wildlife habitats.

OHV use is another wildlife-disturbing activity, which, through removal of vegetation, disturbance of soil, and transport of INNS, can degrade wildlife habitats. In addition to direct impacts of vegetation removal and soil disturbance, the disturbance to wildlife associated with OHV use includes the movement and noise from vehicles and riders. In addition to OHV use, construction, mineral exploration and extraction, recreation, and vehicles traveling on roads can cause noise that adversely impacts wildlife by increasing stress, poaching, and direct mortality (e.g., animal-vehicle collisions).

Some species of wildlife are more sensitive to noise and disturbance than other species, while other species habituate to types of noise or disturbance. For example, The Nature Conservancy (TNC 2000) indicates that male sharp-tailed grouse "…are tolerant of a variety of disturbance but are displaced by human presence." On the other hand, certain magnitudes and frequency of noise may interrupt wildlife communication and adversely impact wildlife. For example, Brattstrom and Bondello (1983) found that the magnitudes and frequencies of occurrence of intense off-road vehicle use in the California desert constitute a potential threat to the well-being of the desert kangaroo rat. In addition, Bowles (1995)

indicates that wildlife can abandon habitats or expend energy as a result of disturbance and can continue to exhibit a response even when they have adapted to the disturbance. Depending on the intensity and frequency of occurrence of the disturbance, incurring energetic expense due to human disturbance during critical periods (e.g., winter) can impact wildlife survival and productivity. USFWS (2002) identifies courtship, nest construction, incubation, and early brooding as higher risk periods in the life-cycles of raptors when adults are more prone to abandoning nests due to disturbance. USFWS (2002) also indicates that human activities resulting in disturbance to raptors can cause raptor population declines. In general, the more area that is subject to noise and human-disturbing activities, such as intense OHV use, or the higher the density of these activities, the more disturbance and adverse impacts to wildlife habitats are anticipated. Avoidance of disruptive activities in big game crucial winter range from November 15 to April 30 across all alternatives would decrease adverse impacts to these species, including noise disturbance.

Livestock grazing may disrupt wildlife by changing habitat through removal of vegetation, disturbance and compaction of soil, and transport of INNS if improperly managed. Transport of INNS and concentrated livestock use at water sources and riparian areas have the most potential to produce detrimental impacts to wildlife habitats. Proper management of livestock grazing, deferring grazing on pastures exposed to wildland fire, monitoring forage utilization, and managing allotments to healthy rangeland standards can minimize or prevent adverse impacts to wildlife. Proper livestock grazing management also may enhance wildlife habitats by reducing buildup of decadent vegetation and removing INNS.

The spread of INNS contributes to loss of certain desirable wildlife habitats, increased soil erosion, reduced water quantity and quality, and reduced structural and species diversity. Controlling the spread of INNS is necessary to maintain the carrying capacity of wildlife habitats. Comprehensive management plans, including controlling and monitoring the spread of INNS, are anticipated to be effective in controlling the adverse impacts of INNS. Targeting and eradicating INNS particularly detrimental to certain wildlife habitats are anticipated to benefit wildlife. For example, salt cedar is an INNS often found adjacent to or within water courses, wetlands, and riparian areas—habitats that are important to numerous wildlife species. If the spread of INNS in the planning area continues, adverse impacts to wildlife habitats are anticipated to be commensurate with the amount of wildlife habitats affected.

Proactive Management Actions. All alternatives implement protections for nesting raptors in the planning area. The timeframe and buffer distance for potential surface-disturbing activities around raptor nests varies by alternative.

Habitat fragmentation is a condition resulting from actions dissecting and isolating habitats. All alternatives protect wildlife habitats to some degree. Developing ROW and corridors, roads, fences, wind energy, minerals, recreational facilities, and urban areas all contribute to habitat fragmentation. The impacts of fragmentation include, but are not limited to, reduction in biological diversity, habitat isolation, impediments to movement, and, in some cases, mortality.

Management actions and allowable uses that protect surface water from impacts associated with soil erosion and pollutants are anticipated to benefit wildlife habitats. In arid climates, such as the planning area, the distribution and quality of water are important factors in the distribution and health of wildlife.

Wildlife species that use water sources and riparian and wetland habitats benefit from management actions common to all alternatives that promote protecting, developing, restoring, and improving water sources. For example, all alternatives protect wetlands, streams, and floodplains from surface-disturbing activities. The distance from these areas in which surface-disturbing activities cannot occur varies by alternative.

All alternatives will retain the existing boundaries for the Raymond Mountain WSA. In addition, this area is managed in compliance with the Interim Management Policy under all alternatives until the U.S. Congress determines its wilderness designation.

Alternative A

Potential impacts to statutory wildlife categories are described in this section in relation to the allowable uses and management actions comprising Alternative A and in the context of the types of impacts described in Impacts Common to All Alternatives earlier in this section.

Surface-disturbing Activities. Alternative A requires the BLM to comply with current standard practices for surface-disturbing activities and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Alternative A also implements an NSO restriction for fluid minerals on slopes greater than 40 percent, while restricting oil and gas activities on slopes greater than 25 percent. Alternative A implements controls for herbicide type and application in riparian areas to reduce the spread of INNS, but does not address the use of certified weed-free forage, feeds, seed, and mulch. These restrictions would benefit wildlife habitats.

Wildlife-disturbing Activities. Alternative A uses prescribed fire to manipulate vegetation to improve plant community health and meet resource objectives. Under Alternative A, fire management plans utilize AMR for wildland fire suppression. Use of wildland fire offers the opportunity to treat vegetation for the benefit of wildlife and other resource programs and to reduce hazardous fuels.

Alternative A limits soil disturbance from heavy equipment during fire suppression. Reclamation of surface disturbance begins within 1 year of the end of operations, and reestablishment of vegetation should occur within 3 years of initial seeding. Stabilization and rehabilitation standards in the Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook may be implemented after wildland fires to sustain healthy ecosystems. In general, fire-suppression activities and stabilization and rehabilitation post wildland fire are anticipated to have adverse and beneficial impacts to wildlife habitats under Alternative A.

Alternative A closes the least acreage to OHV use, potentially leading to disturbance of wildlife. However, Alternative A has the second greatest acreage seasonally closed to OHV use, reducing adverse impacts to wildlife during crucial time periods. These closures also may reduce noise impacts to wildlife.

Alternative A does not require or recommend the use of certified weed-free forage, feeds, seed, or mulch. Lack of these actions could increase the spread of INNS, degrading certain desirable wildlife habitats and adversely impacting wildlife who depend on these habitats.

Proactive Management Actions. Alternative A includes proactive management actions anticipated to benefit wildlife within the planning area. For example, Alternative A manages forestlands to meet public demand, but sale quantity does not exceed annual sustained yield of the forestlands. Forestlands are perpetuated and increased as they are treated. In general, forest management and silviculture treatments under Alternative A are anticipated to have adverse and beneficial impacts to wildlife. Alternative A preserves, protects, and restores natural functions to riparian areas. Forestlands and riparian areas are used by wildlife, and improvements to these communities within the planning area are anticipated to benefit wildlife.

Under Alternative A, existing roads and trails are open for motorized vehicle use, including those in big game winter range; however, big game winter range may be closed to these activities to minimize stress to wintering animals. Seasonal closures are implemented from January 1 to April 30 within the Slate Creek, Rock Creek, and Bridger Creek big game winter range areas. Although exceptions can be granted, this management action is anticipated to benefit big game and other species utilizing these habitats. By applying BLM fencing standards to newly constructed fences, no new BLM-controlled fence barriers would occur; however, most existing problems with fences would remain within 10 years.

As developing resources and resource use increases in the planning area, continued habitat fragmentation—a detriment to big game and other wildlife—is anticipated. Alternative A does not specifically identify proactive management actions to avoid or minimize the adverse impacts from habitat fragmentation.

Alternative A does provide some protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions by implementing an NSO restriction for fluid minerals on slopes greater than 40 percent and avoiding surface-disturbing activities within 500 feet of or within 100-year floodplains, wetlands, riparian areas, and aquatic habitats. In addition, Alternative A does not allow new permanent facilities within the 100-year floodplains unless they benefit the function of the area. Alternative A utilizes livestock grazing in the Mike Mathias Wetlands at Wheat Creek Meadows to enhance wildlife values in the area. These management actions are anticipated to benefit water quality and wetland and riparian areas.

Alternative A maintains the existing Raymond Mountain ACEC for special status species and riparian areas, but does not provide any additional special designations specifically to benefit wildlife. Based on the challenges and existing conditions, the impacts described under Impacts Common to All Alternatives, and the management actions and allowable uses described for Alternative A, impacts to populations in all statutory wildlife categories are expected to continue.

Big Game

The seasonal motorized vehicle closure, January 1 to April 30 of big game winter range in the planning area, benefits big game by reducing stress to wintering animals. Alternative A does not identify large contiguous blocks of intact native vegetation in the planning area for protection from habitat fragmentation. Alternative A does not make specific decisions regarding areas suitable for wind-energy development. Alternative A does not have specific management actions addressing the use of certified weed-free seed, mulch, forage, or feeds to reduce the spread of INNS, which could adversely impact big game habitats. Alternative A does not identify specific management for migration corridors which could result in loss of access to winter ranges and lead to not meeting WGFD population objectives for the impacted species. In western Wyoming, migration distances for mule deer and pronghorn are some of the longest recorded, and the identification and protection of migration corridors and bottlenecks may be necessary to maintain these populations (Sawyer et al. 2005). The management actions for Alternative A generally are expected to maintain existing conditions for big game in the planning area.

Trophy Game

Trophy game in the planning area include black bears and mountain lions. Although the WGFD manages black bear populations, maintaining a healthy black bear population depends on the habitat in which the black bear occurs. Black bears are impacted by management actions in forest and woodland habitats, which, generally, are not focused on providing habitats for black bears or mountain lions.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Russell (1978) indicates that the mountain lion's adaptability and wide distribution precludes designating much habitat as critical for this species; however, human encroachment into habitat supporting mountain lions and their prey reduce opportunities to manage this species. Although no specific management actions exist for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Furbearing animals include badger, beaver, bobcat, American marten, mink, and muskrat. No specific management actions for furbearing animals exist, but these species are impacted by other management actions. Indeed, Storm and Tzilkowski (1982) indicate that land use and habitat markedly influence populations of furbearing animals. Badger and bobcat are habitat generalists and, therefore, are impacted

by actions in a variety of habitats. Impacts to various vegetation types can be found throughout this section.

The American marten is found in forests in the north and south portions of the planning area. American martens generally prefer older coniferous forest stands and aspen. Under Alternative A, no specific management actions aimed at maintaining late-successional forests and woodlands to benefit wildlife exist. BLM-administered lands in the northern portion of the planning area are limited.

Beaver, muskrat, and mink also can be found in association with aspen, but are always near wetland and riparian areas. Under Alternative A, the BLM preserves, protects, and restores natural function in riparian areas. Alternative A does not allow surface disturbance within 500 feet of riparian and wetland areas, benefiting beaver, muskrat, and mink. In addition, Alternative A only allows permanent facilities in these areas only if they benefit watershed health or vegetation. These management actions will benefit beaver, muskrat, and mink habitat.

Predatory Animals

Predatory animals in the planning area include coyote, jackrabbit, porcupine, feral cat, red fox, raccoon, and striped skunk. The BLM does not conduct any specific habitat management activities for predatory animals. Regardless, predatory animals will be affected by BLM management actions for wildlife habitats. These animals are largely habitat generalists and, therefore, would be impacted by actions for a variety of habitat types. Impacts to various vegetation types can be found throughout this section.

Small Game

Small game includes the cottontail rabbit, snowshoe hare, red squirrel, and fox squirrel. No specific management actions for small game exist under Alternative A, but these species are impacted by other biological resource management actions. Habitat fragmentation is an issue for small game populations because their populations tend to be especially disadvantaged by isolation (Temple 1985). Alternative A does not specifically address habitat fragmentation. Cottontail rabbits are habitat generalists and are impacted by a variety of actions in all habitat types. Snowshoe hare and red squirrel inhabit forests and woodlands. Impacts to these habitats are discussed under Nongame (Neotropical Migrants). Fox squirrels occur in riparian forests. Impacts to riparian areas also are discussed under Nongame (Neotropical Migrants).

Game Birds

The BLM (1992a) identifies modifying grazing, conducting prescribed fires, installing water developments, and building roost structures as methods for improving habitats for upland game birds. Ruffed grouse generally are associated with brushy riparian habitats within the conifer zone, and blue grouse generally are associated with upland conifer habitats. These habitat types occur in the northern and southern sections of the planning area. No specific management areas are designated for these species. In general, increased water availability and improvement to riparian habitats in the conifer zone are current management objectives for these species.

Migratory Game Birds

Although there are no specific management actions for migratory game birds, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats for waterfowl. Under Alternative A, the BLM manages wetland and riparian areas to preserve natural functions and implements buffers in these areas and within 100-year floodplains and perennial streams where surface disturbance should be avoided, benefiting migratory game birds. However, no management action exists to reduce channel erosion.

Nongame (Raptors)

The BLM (1992b) identifies declining habitat quantity and quality as the major causes of decreases in raptor populations. In the planning area, disturbance impacts to raptors are minimized by buffer zones around raptor nests. Under Alternative A, the BLM does not allow activity or surface disturbance for up to ¾ of a mile around raptor nests from February 1 through July 31; for peregrine falcons the restriction is extended through August 15. Alternative A protects approximately 116,057 acres around raptor nests. Protective buffers help to minimize, but cannot completely prevent, impacts to raptors because most species are highly mobile well beyond any buffers. Parrish et al. (1994) summarize field-tested mitigation techniques to reduce impacts to raptors and indicate the mitigation techniques most commonly used for raptors impacted by development have been to induce breeding raptor pairs to select a nest site away from development activities.

Wind-energy facilities can be a source of mortality for raptors because raptors can collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Wind-energy facilities also result in habitat loss and human disturbance through construction and maintenance of wind towers and associated facilities. Under Alternative A, no specific decision regarding wind-energy areas exists.

Nongame (Neotropical Migrants)

The BLM (1992c) states that viable nongame bird populations and biological diversity can be promoted by improving livestock management, prescribed fire, removal of INNS, seeding, and erosion control. These actions are managed under Alternative A; however, the spread of INNS is expected to continue under Alternative A.

All neotropical migrants could be adversely impacted by wind-energy facilities, as discussed for nongame raptors. Wind-energy facilities, as well as other linear features (e.g., roads, utility corridors), fragment habitat. Paton (1994) indicates that the success of nongame bird nests declines near habitat edges.

Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitat guilds (note: a guild is a group of species that tend to occur in similar types of habitats): Forest and Woodland Species, Mountain Shrub Species, Sagebrush and Desert Shrub Species, Grassland Species, and Riparian and Wetland Species.

Forest and Woodland Species – No specific management actions exist under Alternative A to manage forests for neotropical migratory birds. BLM actions for silviculture treatments, forest products, and insect control result in short-term disturbance. Forestlands generally are managed to meet public demand. No management actions exist under Alternative A for management of old growth forest areas. Because of their diverse habitat requirements, some neotropical migrants are adversely impacted and some benefit from these management actions.

Mountain Shrub Species – Under Alternative A, no specific management actions exist for mountain shrub communities; however, Alternative A uses prescribed fire, wildland fire use, and chemical, mechanical, and biological treatments to improve plant community health. The long-term beneficial impacts from these treatments outweigh the short-term adverse impacts to neotropical migrants from the treatments themselves. Surface disturbances along the Bear River Divide could adversely impact the mountain shrub species.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section in this chapter. Alternative A manages buffers around greater sage-grouse leks and nesting or early brood-rearing habitats. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from this restriction. Management actions for

pygmy rabbits also may benefit neotropical migrants, although no management actions for pygmy rabbits occur under Alternative A.

Under Alternative A, no specific management actions exist for sagebrush or desert shrub communities. Management actions in sagebrush habitats could impact habitats for many neotropical migrants. Such actions include surface-disturbing activities, reclamation, control of INNS, and livestock and wildlife grazing. Surface-disturbing activities can result in habitat loss and fragmentation and reduce habitat quality. Alternative A does not provide specific guidance or management actions for the prevention of habitat fragmentation. Under Alternative A, the BLM continues to manage the grazing system and range improvements to achieve management objectives for livestock grazing, with an emphasis on category I allotments.

Grassland Species – Under Alternative A, there are no specific management actions for neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative A, grassland habitats could be impacted by long-term surface disturbance on BLM-administered land in the planning area; however, grasslands make up less than 1 percent of BLM-administered lands in the planning area.

Riparian and Wetland Species – Although there are no specific management actions for neotropical migrants that use riparian and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative A, the BLM manages to preserve, protect, and restore natural functions of riparian areas. Alternative A implements a buffer area in riparian and wetland areas, aquatic habitats, and 100-year floodplains in which surface disturbance is avoided. Location of livestock supplements complies with all requirements. These management actions could benefit neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are affected by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are described above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Although bats also can utilize a variety of habitats, caves and abandoned mines are important features for most species. Bats that use caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Abandoned mine closures and recreational caving have been identified as the two major threats to bat habitats (Priday and Luce 1995). Priday and Luce (1999) refer to caves and abandoned mines as “crucial habitat” for some species of bats. As with other species in the planning area, water in close proximity to other habitat features is important to bats, especially maternity colonies (Priday and Luce 1995).

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. All bats could be adversely impacted by wind-energy facilities, as discussed for raptors.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians under Alternative A, these species are impacted by other biological resource management actions. Snakes occur in a variety of habitat types, while lizards typically occur in the drier habitats, particularly those with rock outcrops and cliffs. Aquatic turtles and amphibians require riparian and wetland habitats. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative B

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative B and in the context of the types of impacts described in Impacts Common to All Alternatives. Potential impacts to statutory wildlife categories from Alternative B are described relative to Alternative A.

Surface-disturbing Activities. Alternative B includes more restrictions regarding surface disturbance than Alternative A. For example, Alternative B prohibits surface-disturbing activities on excessively steep slopes of 10 percent or greater, as well as sensitive and highly erosive slopes. In addition, Alternative B prohibits surface disturbance on areas with poor topsoil. Alternative B implements stricter requirements for herbicide application and requires the use of certified weed-free seed and mulch. Once surface disturbance occurs, reclamation requirements under Alternative B are anticipated to reduce adverse impacts to wildlife habitats. The additional restrictions on surface disturbance and stricter reclamation requirements under Alternative B are anticipated to benefit wildlife habitats more than Alternative A.

Alternative B does not allow off-trail travel and closes riparian and wetland areas to OHV use. The Raymond Mountain WSA is closed to mechanized vehicles. The closure of these areas is anticipated to benefit wildlife habitats by reducing habitat fragmentation and erosion and pollutant runoff stemming from such roads and trails in these areas. OHV use under Alternative B is more restricted and, therefore, more beneficial to wildlife habitats. Overall, the tactical constraints, fuels management approach, stabilization and rehabilitation, and use of prescribed fire under Alternative B are anticipated to benefit certain desirable wildlife habitats more than Alternative A.

Wildlife-disturbing Activities. Alternative B allows natural ignitions in areas with wildland fire use plans to proceed to meet desired management objectives. Similar to Alternative A, Alternative B utilizes AMR for wildland fire suppression. Alternative B does not allow soil disturbance during suppression activities without the consent of the authorized officer.

Interim and (or) final reclamation of surface disturbance from drilling activities would be required within 1 year of completion of these activities. Reclamation standards developed at the project level benefit wildlife habitats by actions specific to the area of disturbance. By reestablishing healthy native plant communities, Alternative B benefits wildlife more than Alternative A by maintaining native habitat types in the planning area, rather than just reestablishing vegetative cover on the site. Alternative B's requirement to use certified weed-free seed and mulch slows the potential spread of INNS more than Alternative A, resulting in greater beneficial impacts to wildlife in the planning area.

Alternative B closes the greatest acreage to OHV use, reducing disturbance of wildlife compared to Alternative A. Alternative B also closes the greatest acreage seasonally to OHV use, reducing adverse impacts to wildlife during crucial periods more than Alternative A. These closures also may reduce noise impacts to wildlife.

Alternative B requires the use of certified weed-free forage, feeds, seed, and mulch. These requirements could decrease the spread of INNS, preventing the degradation of certain desirable wildlife habitats and benefiting wildlife depending on these habitats.

Proactive Management Actions. Proactive management actions under Alternative B are anticipated to benefit wildlife through management of large, contiguous blocks of sagebrush, aspen, and mountain shrub communities and the connections among these communities under Alternative B, whereas Alternative A manages vegetation resources to comply with the ESA and BLM policy. Forest management under Alternative B benefits wildlife habitats. For example, Alternative B places limitations on the allowable sale quantities in forests and woodlands, manages 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA for healthy forest landscape objectives, and retains old growth forest areas. These actions promote species diversity, species vitality, and genetic diversity.

Alternative B closes big game crucial winter range to motorized vehicles annually from November 15 to April 30, although exemptions apply. The benefits to big game and other wildlife under Alternative B are anticipated to be greater in these areas than under Alternative A because this closure would prevent disruption of wildlife during crucial time periods. In addition, Alternative B proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section. By removing or modifying all BLM fences to comply with current standards, no BLM-controlled fence barriers would exist within 10 years and most of the planning area would be barrier free within 10 years.

Alternative B provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions. For example, Alternative B closes areas within ¼ mile of perennial streams, riparian and wetland habitats, and 100-year floodplains. Similar to Alternative A, Alternative B does not allow new permanent facilities within the 100-year floodplain unless they benefit the function of the area. In addition, under Alternative B, the Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing. These restrictions are anticipated to benefit water quality and wetland and riparian areas more than Alternative A.

The establishment and designation of MAs and ACECs for special status and wildlife species are anticipated to add restrictions to resource uses in these areas, thereby limiting human activities and associated habitat loss, degradation, and fragmentation. Overall, the designations under Alternative B are anticipated to benefit wildlife. Alternative B maintains the existing Raymond Mountain ACEC for special status plants and riparian areas, but also adds nine ACECs and two MAs. For example, Alternative B establishes the Rock Creek/Tunp and Bear River Divide MAs to benefit critical wildlife habitats. The benefit of establishing these MAs is anticipated to extend to all species in these areas. Alternative B also designates an ACEC for white-tailed prairie dogs that also would benefit other shrubland wildlife species.

Big Game

Alternative B reduces habitat loss and fragmentation due to restrictions on development that lessen the amount of disturbed surface and protect large contiguous blocks of land from fragmentation. Moreover, Alternative B restricts OHV use and livestock grazing in favor of wildlife habitats. Alternative B also utilizes forest management and fire and fuels management as tools to benefit certain desirable wildlife habitats. Alternative B identifies the least acreage as suitable for wind-energy development, limiting potential habitat fragmentation more than under Alternative A. Alternative B also more effectively controls the spread of INNS. Alternative B potentially results in the greatest beneficial impacts to big game of any alternative because it identifies and preserves migration corridors for big game. Preserving these migration corridors maintains access to these areas for big game and would have no adverse impacts on meeting WGFD population objectives for these species. There would be virtually no disturbance to big game in the migration corridors or on winter range. The management actions under Alternative B are anticipated to result in greater beneficial impacts to big game than Alternative A.

Trophy Game

Management actions under Alternative B are anticipated to improve forestland and woodland habitats more than Alternative A, potentially providing improved habitat conditions that benefit black bears in the planning area. Impacts to mountain lions are anticipated to be similar to big game and big game habitats under Alternative B.

Furbearing Animals

Alternative B actions to promote old growth characteristics benefit the American marten. For example, Alternative B retains old growth forest areas and, where possible, retains connectivity of these areas. In

addition, Alternative B maintains or enhances large, contiguous blocks of aspen habitat to minimize habitat fragmentation.

Alternative B manages all riparian areas toward mid-to-late successional stage vegetation benefiting riparian and wetland species, such as the beaver. Alternative B places greater restrictions on surface disturbance in riparian and wetland areas by not allowing this type of disturbance within ¼ mile of these areas and not allowing new permanent facilities in these areas. Alternative B actions protect and enhance riparian and wetland habitats through more restrictive management of livestock in these areas. Management actions include making more areas not available for livestock grazing, including the Mike Mathias Wetlands at Wheat Creek Meadows; larger buffers around water sources, riparian areas, and aspen stands in which mineral supplements are placed; and excluding unallotted public lands with riparian areas to livestock grazing. These actions are anticipated to ultimately result in riparian systems with increased vegetation and structural diversity throughout the planning area, with benefits for beaver, muskrat, mink, and other riparian and wetland species.

Predatory Animals

Alternative B actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative B actions benefiting forestlands, woodlands, riparian areas, and other habitat types are anticipated to benefit the habitat generalist cottontail rabbit, as well as more habitat-specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative B actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Alternative B implements greater protection to riparian areas, benefiting game birds more than Alternative A. Overall, the habitat improvements and protections under Alternative B are greater than Alternative A.

Migratory Game Birds

Alternative B management actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds more than Alternative A. Under Alternative B, the BLM manages wetland and riparian areas to late successional stage vegetation. The buffer around wetlands, riparian areas, perennial streams, and 100-year floodplains where surface disturbance cannot occur is larger under Alternative B. These areas are closed rather than avoidance areas, benefiting migratory game birds more than Alternative A. In addition, Alternative B reduces channel erosion, bank erosion, and channel incision, and restores damaged wetlands.

Nongame (Raptors)

Restrictions around raptor nests are more extensive under Alternative B, since all buffers are 1½ miles, resulting in fewer direct impacts to nesting raptors. Seasonal restrictions vary based on the species of raptor (see Table 2-3). Wind-energy development under Alternative B is anticipated be less than any other alternative since this alternative identifies the least acreage suitable for this type of development in the planning area. Alternative B also manages sagebrush, aspen, and mountain shrub communities in large, contiguous blocks and maintains connections among these communities. In addition, Alternative B protects riparian areas, restricts livestock grazing, and increases control of INNS. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative B management actions pertaining to forest management; management of sagebrush, aspen, and mountain shrub communities; INNS control; habitat fragmentation; protection of water sources; and fire and fuels management are anticipated to benefit nongame neotropical migrants in the planning area. In addition, the raptor nest buffer (1½ miles) under Alternative B, would benefit all neotropical migrants within these buffer areas by resulting in fewer disturbances to all of the guilds during the crucial periods.

Forest and Woodland Species – Alternative B limits treatment areas on forests and woodlands and tries to restore structure and composition to more historical conditions. Treatments in the Raymond Mountain WSA are managed to simulate natural alteration of vegetation. Alternative B retains old growth forest areas and may restore some forest areas to old growth conditions. Treatments of forests and woodlands may result in younger-aged areas. The anticipated mix of seral stages benefit a variety of neotropical migrants. In addition, Alternative B manages for large, contiguous blocks of aspen communities, benefiting neotropical migrants in this habitat.

Mountain Shrub Species – Under Alternative B, the BLM places an increased importance on mountain shrub communities by managing for large, contiguous blocks of mountain shrub communities, benefiting neotropical migrants in this habitat.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse, as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from these restrictions. Alternative B protects the same size buffers as Alternative A, thereby benefiting neotropical migrants.

Alternative B provides more restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs. The area disturbed is smaller and reclamation of disturbed areas focuses on reestablishment of native plant communities; thereby, maintaining long-term habitat quality in all habitat types, including sagebrush. Alternative B seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INNS by implementing a requirement to use certified weed-free seed and mulch. Furthermore, Alternative B manages grazing systems and range improvements to enhance watershed, riparian, and wildlife values. These management actions are anticipated to benefit sagebrush and desert shrub species more than Alternative A.

Grassland Species – Under Alternative B, grassland species benefit by more reclamation requirements, more INNS control, and more restrictions to livestock grazing. In addition, Alternative B actions limiting habitat fragmentation are anticipated to benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative B management actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants using these areas. For example, Alternative B manages all riparian areas for mid-to-late successional vegetation. Alternative B increases the buffer around these areas in which surface disturbance is prohibited compared to Alternative A, which avoids surface disturbance in these areas. Alternative B protects and enhances riparian and wetland areas by using grazing systems and range improvements to enhance these areas and wildlife values. These actions are anticipated to ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the

various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because wind-energy development could occur on less acreage than Alternative A, impacts to bats under Alternative B are anticipated to be less than Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative B. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative C

Potential impacts to wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative C and in the context of the types of impacts described in the Impacts Common to All Alternatives section. Potential impacts to wildlife categories from Alternative C are described relative to Alternative A.

Surface-disturbing Activities. Alternative C includes similar restrictions regarding surface disturbance as Alternative A. For example, Alternative C allows surface-disturbing activities on poor topsoils and implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Alternative C has the greatest acreage identified as suitable for wind-energy development. Overall, surface-disturbing activities under Alternative C are anticipated to be similar to Alternative A.

Once surface disturbance occurs, reclamation requirements under Alternative C are anticipated to produce similar impacts to wildlife habitats as under Alternative A. Alternative C allows limited off-trail travel, offering more protection for habitat from OHV use than Alternative A. Similar to Alternative B, the Raymond Mountain WSA is closed to OHV use. The restrictions on surface disturbance under Alternative C are anticipated to result in impacts to wildlife habitat similar to Alternative A.

Wildlife-disturbing Activities. This alternative uses full protection strategies and suppresses all wildland fires throughout the planning area; however, it uses similar methods for INNS control as identified in Alternative A. Prescribed fire, wildland fire, and chemical, biological, and mechanical treatments are not used in Alternative C to meet fuels management objectives, reduce hazardous fuels, or reintroduce fire to its natural role in the ecosystem. Overall, the fire management approach under Alternative C is anticipated to have less beneficial and more adverse impacts to certain desirable wildlife habitats. Alternative C does not allow natural ignitions within areas with wildland fire use plans to proceed to meet desired management objectives. Instead, Alternative C suppresses all wildland fires and allows soil disturbance from suppression activities only if private or public habitable structures or industrial facilities are at risk.

Reclamation of surface disturbance is the same as described in Alternative A. Unlike Alternative A, Alternative C recommends the use of certified weed-free seed and mulch to slow the potential spread of INNS, resulting in greater beneficial impacts to wildlife in the planning area.

Alternative C closes the same acreage to OHV use as Alternative A, potentially leading to disturbance of wildlife. However, Alternative C has no seasonal closures for OHV use, potentially resulting in the greatest adverse impacts to wildlife during crucial periods. Lack of these closures also may increase adverse impacts from noise to wildlife.

Alternative C recommends the use of certified weed-free forage, feeds, seed, or mulch. If these products are used, the spread of INNS could decrease, similar to Alternative B; however, if these products are not

used, the impacts to wildlife would be similar to Alternative A and could increase the spread of INNS, degrading certain desirable wildlife habitats and adversely impact wildlife depending on these habitats.

Proactive Management Actions. Alternative C includes proactive management actions anticipated to benefit wildlife within the planning area. For example, Alternative C treats forestlands and woodlands to reduce stocking levels and structure and composition to more historic conditions. Alternative C designates the largest probable allowable sale quantity of all alternatives. In general, forest management and silviculture treatments under Alternative C are anticipated to have adverse and beneficial impacts to wildlife. Alternative C manages riparian areas similar to Alternative A. Improvements to forestlands and riparian areas within the planning area are anticipated to benefit wildlife.

Under Alternative C, existing roads and trails are open for motorized vehicle use, including those in big game winter range, potentially disrupting wildlife during crucial periods. This management action is anticipated to adversely impact big game. Alternative C provides more protection to wildlife habitats by avoiding habitat fragmentation than Alternative A; however, similar to Alternative A, Alternative C does not manage for large, contiguous blocks of native vegetation. Impacts associated with fences would be the same as described under Alternative A.

Alternative C does provide similar protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions as under Alternative A. Alternative C opens the Mike Mathias Wetlands at Wheat Creek Meadows to livestock grazing, potentially adversely impacting wildlife habitats in the area. Ducks Unlimited (2004) indicates that concentrations of livestock around wetlands, especially in the summer, can have localized impacts on wetland habitats important to waterfowl.

Alternative C does not retain the existing Raymond Mountain ACEC for special status species and riparian areas and does not designate or establish any other ACECs or MAs. Based on the challenges and existing conditions, the impacts described under Impacts Common to All Alternatives, and the management actions and allowable uses described for Alternative C, impacts to populations in all statutory wildlife categories are expected to continue and be similar to Alternative A.

Big Game

Alternative C does not implement seasonal restrictions to motorized vehicle use for any big game crucial winter range. Alternative C has the greatest acreage suitable for wind-energy development, potentially disrupting wildlife more than all other alternatives. Although Alternative C does not identify large, contiguous blocks of intact native vegetation to protect from habitat fragmentation as under Alternative B, Alternative C does address and avoid habitat fragmentation more than Alternative A. Alternative C recommends the use of certified weed-free seed, mulch, forage, and feeds to reduce the spread of INNS. In addition, Alternative C identifies and develops management for big game migration and travel corridors and impacts would be slightly greater than those described for Alternative B, as limited disturbance in these areas could occur. Alternative C is anticipated to result in greater beneficial impacts to big game than Alternative A.

Trophy Game

Management actions for forest and woodland habitats under Alternative C are anticipated to result in the greater beneficial impacts to trophy game species than Alternative A. Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

While no specific management actions for American marten are included, Alternative C retains old growth forest areas in appropriate locations using an adaptive management approach in both coniferous

and aspen communities. Although Alternative C allows the highest probable sale quantity, management of some areas as old growth will benefit the American marten more than Alternative A. Avoidance of habitat fragmentation in aspen communities also benefits American marten more than Alternative A.

Management of riparian areas under Alternative C is similar to Alternative A; however, Alternative C allows new permanent facilities in these areas if no other practicable locations exist and sufficient mitigation occurs. Restrictions to livestock grazing are similar to Alternative A; however, Alternative C opens the Mike Mathias Wetlands at Wheat Creek Meadows to livestock grazing. Management of livestock grazing under Alternative C focuses on maximizing livestock grazing while meeting standards and guidelines. Alternative C is anticipated to result in similar impacts to beaver, muskrat, and mink as Alternative A.

Predatory Animals

Alternative C actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative C actions benefiting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit and more habitat specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative C actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Beneficial impacts in riparian areas are anticipated to be similar to Alternative A.

Migratory Game Birds

For the most part, Alternative C actions pertaining to water, wetland, and riparian areas are similar to Alternative A, therefore resulting in similar impacts to migratory game birds. However, Alternative C reduces channel and bank erosion and channel incision similar to Alternative B, benefiting migratory game birds more than Alternative A.

Nongame (Raptors)

Alternative C restrictions around raptor nests are less than Alternative A because seasonal restrictions vary with species and nest buffers are smaller (see Table 2-3). Alternative C identifies the greatest acreage suitable for wind-energy development of all alternatives. Alternative C does not manage large, contiguous blocks of sagebrush, aspen, and mountain shrub communities. While the nesting buffers benefit raptors, Alternative C is anticipated to have similar beneficial impacts to raptors as Alternative A because of the similar potential wind-energy development.

Nongame (Neotropical Migrants)

Alternative C actions pertaining to forest management, INNS control, habitat fragmentation, and protection of water sources are anticipated to benefit nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative C does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; rather, Alternative C allows the greatest probable sale quantity. Alternative C retains old growth forest areas based on evaluations, using an adaptive management approach. Treatments in the Raymond Mountain WSA are similar to Alternative B. Alternative C does not manage for large, contiguous blocks of aspen communities, similar to Alternative A.

Mountain Shrub Species – Similar to Alternative A, Alternative C does not manage for large, contiguous blocks of mountain shrub communities.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section. Because the breeding season of the greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Buffer sizes under Alternative C are the same as those under alternatives A and B, thereby benefiting sagebrush and desert shrub neotropical migrants.

Potential surface disturbance under Alternative C is less than Alternative A, but greater than all other alternatives; however, reclamation under Alternative C is similar to Alternative A. Alternative C recommends the use of certified weed-free seed and mulch. Grazing systems and range improvements under Alternative C focus on maximizing livestock grazing while still meeting standards and guidelines. Alternative C is anticipated to have greater beneficial impacts to sagebrush habitats than Alternative A.

Grassland Species – Under Alternative C, grassland species benefit less due to fewer restrictions on livestock grazing. However, Alternative C actions limiting habitat fragmentation are anticipated to more often benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative C manages riparian and wetland areas similar to Alternative A. Livestock grazing is maximized while still meeting standards and guidelines. Alternative C also implements greater measures to reduce INNS than Alternative A. Alternative C is anticipated to result in similar impacts as Alternative A to neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because from the acreage suitable for wind-energy development under Alternative C is greatest of all alternatives, , impacts to bats under Alternative C are anticipated to be greater than Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative C. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative D (Preferred Alternative)

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative D and in the context of the types of impacts described in the Impacts Common to All Alternatives section. All potential impacts to wildlife categories from Alternative D are described relative to Alternative A.

Surface-disturbing Activities. Alternative D includes more restrictions regarding surface disturbance than Alternative A, but less compared to Alternative B. For example, Alternative D allows, but minimizes, surface disturbance on sensitive soils on slopes 20 percent or greater, protects the Green River and Bear River sub-basins from increased erosion, and avoids disturbances on sensitive soils. Alternative D is similar to Alternative B in its reclamation requirements and is anticipated to reduce adverse impacts to wildlife habitats. Alternative D prohibits soil disturbance from suppression-related activities without

consent of the authorized officer. Overall, the tactical constraints, fuel management approach, stabilization and rehabilitation, and use of prescribed fire under Alternative D are anticipated to benefit wildlife habitat more than Alternative A.

OHV use under Alternative D is more restricted and, therefore, more beneficial to wildlife habitats. Alternative D identifies developing travel management plans similar to Alternative C. Some closures of areas to motorized vehicles is anticipated to benefit wildlife habitats by reducing habitat fragmentation, erosion, and pollutant runoff coming from roads and trails.

Wildlife-disturbing Activities. Use of prescribed fire under Alternative D is anticipated to benefit wildlife habitats more than in Alternative A, since management objectives are based on thresholds. Alternative D allows the use of wildland fire to meet desired management objectives, which is anticipated to benefit certain desirable wildlife habitats.

Buffer distances around riparian and wetland areas for treatment of INNS are the same as Alternative A. Similar to Alternative B, Alternative D requires the use of certified weed-free seed, mulch, forage, and feeds to control the spread of INNS. Alternative D is anticipated to slow the spread of INNS within the planning area and thereby benefit certain desirable wildlife habitats.

Alternative D closes the second greatest acreage to OHV use, reducing disturbance of wildlife compared to Alternative A. Alternative D also closes the second greatest acreage seasonally to OHV use (similar to Alternative A), reducing adverse impacts to wildlife during crucial time periods more than Alternative C, but less than Alternative B. These closures also may reduce noise impacts to wildlife.

Alternative D requires the use of certified weed-free forage, feeds, seed, and mulch. These requirements would result in the same impacts to wildlife as Alternative B.

Proactive Management Actions. Proactive management actions under Alternative D are anticipated to benefit wildlife. Management of large contiguous blocks of sagebrush, aspen, and mountain shrub communities and the connections among these communities, similar to Alternative B, limit habitat fragmentation more than Alternative A. Forest management under Alternative D benefits wildlife habitats. For example, Alternative D places limitations on the allowable sale quantities in forests and woodlands, manages 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA for healthy forest landscape objectives, and retains old growth forest areas, similar to Alternative B. These actions promote species diversity, species vitality, and genetic diversity.

Alternative D closes four big game crucial winter ranges to motorized vehicles annually from January 1 to April 30, although exemptions apply. The benefits to big game and other wildlife under Alternative D are anticipated to be similar to Alternative A. In addition, Alternative D proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section. Under Alternative D, select BLM-controlled fence barriers would be eliminated and crucial habitats would mostly be barrier free within 10 years.

Alternative D provides similar protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions as Alternative A; however, Alternative D implements greater restrictions for placing new structures within the 100-year floodplain. Alternative D manages livestock grazing in the Mike Mathias Wetlands at Wheat Creek Meadows similar to Alternative A. These restrictions are anticipated to benefit water quality and wetland and riparian areas similar to Alternative A.

Alternative D maintains the existing Raymond Mountain ACEC for special status plants and riparian areas, but also adds two MAs that directly benefit wildlife habitats. For example, Alternative D establishes the Rock Creek/Tunp and Bear River Divide MAs to benefit critical wildlife habitats;

however, the acreages for each of these MAs is smaller than that established under Alternative B. The benefit of establishing these MAs is anticipated to extend to all species in these areas.

Big Game

Alternative D limits adverse impacts on big game crucial winter range by seasonally closing four areas to motorized vehicles. Alternative D identifies more suitable areas for wind-energy development than Alternative B, but less than Alternative C. Alternative D limits habitat fragmentation similar to Alternative C, but manages large, contiguous blocks of sagebrush, aspen, and mountain shrubland similar to Alternative B. Also similar to Alternative B, Alternative D requires the use of certified weed-free mulch, seed, forage, and feeds to reduce the spread of INNS. Similar to Alternative C, Alternative D identifies and develops management for big game migration and travel corridors which would maintain most big game access to these areas. Some limited adverse impacts could occur, but would not likely result in failure to meet WGFD population objectives. The management actions for Alternative D are anticipated to result in beneficial impacts to big game, greater than those under Alternative A, but less than Alternative B.

Trophy Game

Management actions in forest and woodland habitats under Alternative D are anticipated to result in less adverse impacts to trophy game species than Alternative A. Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Alternative D actions to promote old growth characteristics and the impacts of these actions to American marten are similar to Alternative B. Alternative D specifies the acreage treated in forests and woodlands, which is less than Alternative C, but more than Alternative B. Also similar to Alternative B, Alternative D maintains or enhances large, contiguous blocks of aspen habitats to minimize habitat fragmentation.

Alternative D manages riparian areas for horizontal and vertical structure and composition to a successional stage appropriate for sensitive wildlife, which is anticipated to benefit other wildlife species in the area. Alternative D takes into account managing riparian areas for wildlife and livestock and to improve stream quality. Alternative D is anticipated to result in greater beneficial impacts than Alternative A to beaver, muskrat, mink, and other riparian and wetland species. Alternative D manages the Mike Mathias Wetlands at Wheat Creek Meadow similar to Alternative A. In addition, Alternative D manages grazing systems and range improvements to achieve resource management objectives. Alternative D is anticipated to have greater beneficial impacts to furbearers in riparian and wetland areas than Alternative A.

Predatory Animals

Alternative D actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative D actions impacting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit, and produce mixed results for more habitat-specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative D actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Beneficial impacts are anticipated to be greater than Alternative A.

Migratory Game Birds

Alternative D actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Alternative D specifically manages both horizontal and vertical vegetative structure and composition in riparian areas. Similar to alternatives B and C, Alternative D reduces channel and bank erosion and channel incision, resulting in greater beneficial impacts to migratory game birds than Alternative A.

Nongame (Raptors)

Alternative D prohibits surface disturbance from February 1 to July 31 for all raptor nests except burrowing owl (April 1 to September 15, or whenever the young have fledged) and northern goshawk (April 1 to August 31). Buffer distances vary by species (see Table 2-3). Because Alternative A is a blanket restriction it may pose unnecessary restrictions on other resources, while Alternative D serves reduce unnecessary restrictions while meeting species requirements for protection. Alternative D identifies the second greatest acreage suitable for wind-energy development, potentially resulting in the second greatest adverse impacts to raptors. Alternative D manages large, contiguous blocks of aspen, sagebrush, and mountain shrub communities similar to Alternative B, benefiting raptors and their prey species.

Nongame (Neotropical Migrants)

Alternative D actions pertaining to forest management; management of sagebrush, aspen, and mountain shrub communities; INNS control; habitat fragmentation; and protection of water sources are anticipated to impact nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative D does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; however, treatments in these areas are anticipated to benefit neotropical migrants in the long term. Management for old growth areas and large, contiguous blocks of aspen communities is similar to Alternative B.

Mountain Shrub Species – Similar to Alternative B, Alternative D manages for large, contiguous blocks of mountain shrub communities, benefiting the species utilizing this habitat.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitat benefit from management actions for greater sage-grouse as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Alternative D protects the same size buffers around greater sage-grouse leks and the same-size buffers around nesting and early brood-rearing habitats, thereby resulting in similar benefits to sagebrush and desert shrub neotropical migrants.

Alternative D provides similar restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs, as discussed under Alternative B. The areas disturbed are greater under Alternative D, but reclamation of disturbed areas is similar to Alternative B. Grazing under Alternative D is designed to achieve management objectives and improves range conditions on Category I allotments.

Grassland Species – Under Alternative D, there are no specific management actions for neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Surface

disturbance under Alternative D is less than Alternative A, and Alternative D limits habitat fragmentation similar to Alternative C, which would result in beneficial impacts to grassland habitats and grassland species.

Riparian and Wetland Species – Alternative D actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants that use riparian and wetlands. For example, Alternative D manages the vertical and horizontal vegetative structure and composition of these areas to enhance forage conditions and improve stream quality. Alternative D does more to reduce the spread of INNS by requiring the use of certified weed-free seed and mulch, similar to Alternative B. Surface disturbance under Alternative D is the second lowest of all alternatives. The greater measures to protect riparian and wetland habitats result in greater beneficial impacts to neotropical migrants in these areas than Alternative A.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because wind-energy development could occur on less acreage than Alternative C, adverse impacts to bats under Alternative D are anticipated to be less than Alternative C, but greater than Alternative B.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative D. The impacts of management actions on these habitat types are discussed throughout this section.

4.4.5.3 Conclusion

Overall, Alternative B provides more measures to minimize habitat loss and fragmentation in the planning area compared to Alternative A. Therefore, implementing Alternative B could have fewer adverse impacts on wildlife and habitats. Alternative D includes similar measures to Alternative B, but allows more surface-disturbing activities. Alternative D is expected to have less adverse impacts than Alternative A due to more restrictions. Alternative C allows the second most surface disturbance of any alternative, resulting in adverse impacts to wildlife resources greater than those under alternatives B and D.

Implementing Alternative B, followed by Alternative D, could result in more improvements to habitat quality, provide more measures to restrict activities that could damage sensitive soils and habitats, reserve more forage for big game on crucial winter range, and set aside more lands for new MAs with specific actions to benefit wildlife resources. Alternative A has little guidance to protect or improve habitat quality. Alternatives A and C do not establish any new MAs. Requirements to use certified weed-free seed, mulch, feeds, and forage under alternatives B and D could result in long-term beneficial impacts to wildlife habitat quality. Alternative B provides the most protection for big game on crucial winter ranges from surface-disturbing activities and OHV use. Based on the actions and uses identified, alternatives ranked in order of increasing potential adverse and decreasing beneficial impacts to the wildlife categories presented in this section are B, D, C, and A.

4.4.6 Special Status Species – Plants

Actions that could occur through implementing each alternative may affect special status plant species. This section describes the impacts of each alternative on special status plants in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to special status plant species. See Map 23 for a depiction of the distribution of select special status plant species for all alternatives.

Allowable uses and management actions that contribute to the decline in abundance or distribution of special status plants are considered adverse. Conversely, beneficial impacts to special status plants comprise activities that protect habitats or reduce the risk of harm to these species in the planning area. An increase in special status plant population numbers in response to an enhanced habitat or the increased viability of a species would be considered a beneficial impact.

Direct impacts to special status plant species are defined, for this analysis, as actions resulting in damage to or loss of individual special status plants. Surface-disturbing activities, herbivory, trampling, fire, and herbicide application are considered the primary means by which direct impacts to special status plants could occur. Plant collection and OHV use also could remove vegetation and disturb soil, directly impacting special status plant populations. Indirect impacts to special status plant species are defined as actions that aid or compromise the protection of special status plants. The loss or degradation of suitable habitats for special status plant species is considered an indirect impact. Indirect impacts to potential habitats for special status plants also could occur when actions change the habitats in a way that makes them unsuitable for future colonization.

For the purpose of this analysis, short-term impacts to special status plant species include those activities that contribute to the decline in abundance or distribution of a species within 5 years of when the activity occurs. Long-term impacts to special status plants are those that require more than 5 years to manifest on the surface.

4.4.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Surface-disturbing or other disruptive activities, including ROW, in special status plant areas would adversely impact special status plant species.
- The amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown and could underestimate the potential impact of surface disturbance on special status plant populations.
- Reclamation of surface disturbance and reestablishment of vegetation minimizes adverse impacts to soils and, therefore, to special status plant species. The sooner the reestablishment of vegetation occurs, the greater the benefit would be to special status plant species.
- Assumptions described in the Vegetation – Riparian and Wetland Communities section of this chapter are used in analyzing the impacts on potential habitat for special status plant species that occur in these habitat types, including Ute ladies'-tresses, an orchid that currently is not known to occur in the planning area, but typically occurs in wetlands and riparian habitat. Special status plant species that occur or have the potential to occur in wetlands and riparian habitats may be impacted by water quality or water use in the planning area.
- All management actions associated with protecting wildlife habitats and cultural resources directly benefit special status plant species.

- Actions that reduce the threat of establishment or spread of INNS directly benefit special status plant species. Instruction Memorandum 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands.
- The existing provisions in place (e.g., presence/absence surveys by a qualified botanist during the appropriate phenological stage [e.g., blooming] for positive identification and conducted prior to proposed actions) to protect special status species are carried out and conditional monitoring is conducted (e.g., grazing and surface disturbance reclamation) to ensure special status species are not jeopardized.
- Establishing MAs that preclude or restrict development, including those not specifically aimed at conserving special status plant species, are assumed to benefit special status plant species.
- Because not all locations of special status plant species in the planning area are known and because the locations of potential actions under the different alternatives also are not known, the analysis of potential impacts to special status plant species focuses on the threats and management challenges identified in Chapter 3.
- Because the densities and locations of special status plant species in the planning area are not entirely known, impact analyses are based on the amount of vegetation and soil disturbed, the potential for spread of INNS, and the level of restrictions placed on BLM actions that could adversely impact special status plant species.

4.4.6.2 Analysis of Alternatives

Allowable uses and management actions that could impact special status plant species include all surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, INNS, and proactive management actions.

As special status plant species are impacted by the alternatives, protective management of these species can impact resource uses. For example, actions designed to conserve special status plant species could limit mineral development, fire and fuels management, livestock grazing, vegetation treatments, OHV use, and control of INNS. The impacts of special status plant species on other resource topics (e.g., fire and fuels management, etc.) are not anticipated to be substantial; however, details are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status plant species because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Described below are potential types of impacts common to all alternatives.

Habitats for special status plants can be impacted by various surface-disturbing activities, such as mineral exploration and development, construction associated with communication or alternative energy (e.g., wind-energy) sites, and associated transportation corridors. Other activities that may remove vegetation and disturb soil, thus potentially adversely impacting habitats for special status plant species, include livestock and native ungulate grazing, intensive recreational use, and human plant collection. Because none of the special status plants that may occur in the planning area depends on forest habitats, forest management and silviculture treatments are not expected to impact special status plant species.

Surface disturbance also can indirectly impact special status plants by contributing to soil erosion that adversely impacts watershed health and contributes to the transport of INNS along the network of roads and watersheds. Soil compaction and erosion, alteration of hydrologic regimes, insecticide applications that may kill pollinators, modified fire-return intervals, and the introduction of native habitats by INNS are potential indirect impacts to special status plant species. Habitat is degraded, lost, and fragmented by activities such as fire and fuels management, grazing by livestock and wildlife, road and trail building,

OHV use, and recreation. Fragmentation adversely affects special status plants by increasing the amount of habitat edge (Knight et al. 2000), which leads to noxious weed proliferation and microclimate alterations through increased wind and solar exposure. Populations of special status plants frequently have a patchy distribution across the landscape; therefore, elimination of one or more populations can prevent gene flow among populations if residual populations are too far apart for sufficient cross-pollination. Natural surface road networks contribute to a reduction in photosynthetic capacity in plants adjacent to roads when vehicle traffic contributes to additional dust deposits on leaf surfaces (Knight et al. 2000).

Some of the surface disturbance that occurs under each alternative would be reclaimed. The sooner successful reclamation occurs, the greater the benefit to sensitive plant species. Rehabilitation plans are developed and implemented on newly disturbed areas and for existing disturbances, as needed. Follow-up seeding and (or) corrective erosion-control measures are required on areas of surface disturbance that experience reclamation failure. However, not all impacts to special status plants from surface disturbance are offset by reclamation of disturbed lands because reclaimed lands often do not support the same plant community structure and composition as the habitat that was disturbed. Many special status plants are rare because of their association with a rare habitat, advanced successional stage, or specific landscape feature. These plants might not reestablish on reclaimed lands if the unique habitat characteristics they require are no longer present. Moreover, INNS may establish on reclaimed lands and prevent restoration of historical plant communities.

Grazing (both livestock and wildlife) may provide both adverse and beneficial impacts to special status plant species, depending on grazing intensity, timing and (or) season of grazing, range conditions, and precipitation regimes. Grazing, particularly in sensitive riparian areas, can result in direct mortality to special status plants through trampling or herbivory, and indirect impacts due to soil compaction and erosion, changes in plant community composition and structure, and increased spreading of INNS (Fitch and Adams 1998). Inappropriate livestock grazing management is a threat to some plant species; grazing has been considered a factor in the endangerment of some imperiled plant species in the United States (Wilcove et al. 1998). Beneficial impacts include grazing that removes competition for light, water, or nutrient from other plants in a rare species habitat.

Some management actions also would benefit special status plants. For example, management actions to control INNS benefit special status plants by reducing competition. Other resource management actions that may indirectly benefit special status plant species include surface disturbance constraints to protect visual, cultural, floodplains, fish, wildlife, and vegetation resources, as well as MAs and NHT buffer areas.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities from all actions listed in Appendix M could impact potential habitats for special status plants and undocumented populations. Such activities also fragment habitats, which can isolate populations of special status plants. Long-term impacts to sensitive plants are mitigated by reclamation, but surface disturbance continues to impact sensitive plant populations occurring on reclaimed lands through changes in plant community structure or encroachment of INNS. BLM actions under Alternative A are anticipated to impact 214,120 acres and 144,673 acres in the short- and long-term, respectively, in the planning area over the life of the plan. No specific constraints on resource management to minimize habitat fragmentation are identified for Alternative A.

Approximately 1,475,000 acres of federal mineral estate are currently administratively available to oil and gas leasing consideration under Alternative A. All of the area available for leasing is subject to the terms and conditions of the standard lease form, with 57 percent also subject to moderate constraints and 25 percent subject to major constraints. Fluid mineral leasing is allowed on areas within habitat for federally listed species; however, if plant surveys document a listed species, protective measures need to be developed and implemented in coordination with the USFWS. Four known populations of *Physaria*

dornii (a BLM-sensitive species) have NSO restrictions for fluid minerals. No special measures exist to protect special status plants from motor vehicle damage. In addition, public lands outside the Raymond WSA are available for other leasable minerals leasing considerations. Mineral material sales and (or) free use permits can be authorized in areas with special status plant species on a case-by-case basis. Additional leasing constraints that benefit special status plants could be considered.

Under Alternative A, surface-disturbing activities utilize existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance to reestablish healthy native plant communities based on preexisting composition (where possible) begins within 1 year of the abandonment of operations. If unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. Management actions limiting surface disturbance will benefit special status plants.

Fire and Fuels Management. Under Alternative A, wildland fire suppression follows an AMR as identified in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Special status plant species in the planning area are not anticipated to be adversely impacted by prescribed fire that mimics a natural fire regime. Intense wildland fire-suppression tactics are anticipated to be the most likely actions to adversely impact undocumented populations of special status plant species. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which would also protect special status plant species. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed in special status plant species populations or within 200 feet of surface water sources. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and result in a beneficial impact for special status plant species.

Livestock and Native Ungulate Grazing. The entire planning area currently is open to livestock grazing with the exception of a few small parcels. Temporary, nonrenewable permits are not issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on I category and maintaining M and C category (see Glossary) grazing allotments. The location of salt or mineral supplements complies with requirements determined on a site-specific basis, but neither salt nor mineral supplements are allowed on areas with special status plant species. Range improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities are not allowed on areas with special status plant species.

The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management. The anticipated adverse impacts to special status plant species from current livestock grazing include introduction and (or) spread of INNS, soil erosion and compaction at livestock concentration areas, and removal of vegetation. These adverse impacts are not anticipated around known locations of special status plant species; however, direct and indirect adverse impacts could occur at unknown locations. Native ungulates are anticipated to have similar adverse impacts as livestock to special status species in areas where they concentrate.

OHV Use. OHV use disturbs soils and removes vegetation, thus potentially impacting habitats for special status plants. Current OHV use is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA has been designated

"closed" to OHV use. There are no specific measures to protect special status plant species from dust from unpaved roads or motor vehicles. The anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative A due to OHV use is anticipated to indirectly and adversely impact populations of special status plant species.

INNS. Management of INNS could directly benefit special status plants by eliminating direct competition and maintaining habitat health and diversity. However, application of chemicals and other INNS control methods also have the potential to remove vegetation or cause soil disturbance that can adversely impact special status plants. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation, wetlands, and special status plant species. Aerial application of chemicals is not allowed within 100 feet of these resources. Vehicle application is not allowed within 25 feet and hand application is not allowed within 10 feet of open water. Chemicals are mixed a minimum of 500 feet from sensitive resources, including riparian areas, wetlands, and special status plant populations. Application of chemicals in special status plant areas are considered on a case-by-case basis in coordination with the authorized officer.

Proactive Management Actions. Management of other resources could indirectly impact special status plants. Beneficial impacts to special status plants occur with the protection and conservation of land for other resources.

Under Alternative A, all appropriate measures to protect all threatened, endangered, and sensitive plant species are applied to all actions and use authorizations, including NSO restrictions for fluid minerals (currently, four populations of *Physaria dornii* have the NSO restriction). Areas where special status plants are known to occur are ROW avoidance areas. Potential special status plant species habitats on federal land or split-estate lands require surveys for the plant species prior to approving any project or activity. Should a population be found, all disruptive activities are halted until species-specific protective measures are developed and implemented.

Potential habitats for special status plant species are areas of CSU for surface-disturbing activities or vegetation treatments. In addition, there are 12,667 acres in the Raymond Mountain ACEC plan that protect riparian areas, which may provide protection for special status plant species occurring in these habitats. Management actions that protect special status plant species, as well as other resources (e.g., wildlife, cultural resources), provide direct and indirect beneficial impacts to special status plant species.

Alternative B

Surface-disturbing Activities. Under Alternative B, there are 106,175 acres (approximately 50% less) short-term and 47,693 acres (approximately 67% less) long-term disturbance anticipated in the planning area from BLM actions compared to Alternative A. Approximately 41 percent less acreage of federal mineral estate is administratively available for oil and gas leasing compared with Alternative A, with the majority (86%) subject to the terms and conditions of standard lease plus major constraints. No new fluid mineral leasing occurs on currently unleased areas within potential habitats for federally listed species. Withdrawals from locatable mineral development are pursued for areas with special status plant species. No mineral material sales and (or) free use permits are authorized in areas with special status plant species. The restrictions on habitat fragmentation and fewer disturbed acres relative to Alternative A are anticipated to indirectly benefit special status plants by protecting potential habitats and minimizing the spread of INNS and soil erosion.

Under Alternative B, all proposals for surface-disturbing activities within the planning area require soil surveys and analysis, which could include discovery of unknown special status plant populations. Similar to Alternative A, surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines; however, surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control. Disturbances on soils with fragile, steep slopes, chemical and biological

crusts, and soils with low reclamation potential and highly erodible characteristics are prohibited. Alternative B provides greater protection and minimizes impacts to soils compared with Alternative A, therefore providing greater protection and minimization of potential impacts to known and unknown locations of special status plant species.

Interim reclamation of surface disturbance occurs within the first planting season after the rig is moved off location for oil and gas operations. Final abandonment of well locations will occur within the first planting season once the well is plugged. For surface disturbances that occur under authorized activities other than oil- and gas-related actions, reclamation occurs within the first suitable planting season after operations have ceased. If a healthy native plant community or other species as identified in an approved management plan are not established within 3 years of initial seeding, follow-up seeding and nutrient testing would occur to determine if additional reclamation is needed. Appropriate reclamation standards are developed at the project level. The sooner reclamation occurs, the greater benefit to special status plant species. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on a preexisting species composition or other species as identified in an approved management plan.

Based on the acreage of surface disturbance and the management actions implemented to reduce disturbance to special status plant species, direct and indirect adverse impacts from surface-disturbing activities to special status plant species under Alterative B are expected to be less than under Alternative A. In addition, Alternative B provides greater beneficial impacts to special status plant species than Alterative A.

Fire and Fuels Management. Alternative B is similar to Alternative A except that under Alternative B, soil disturbances are not allowed in the planning area during fire suppression without consent of the authorized officer. Use of fire-suppression chemicals, including foaming agents and surfactants, are not allowed within ¼ mile of special status plant species populations or within 500 feet of surface water sources. Similar to Alternative A, treatments could be used to meet fire and fuels resource management objectives, but the objectives are based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area.

Alternative B restricts the use of heavy equipment and fire-suppression chemicals in a broader area than Alternative A. Alternative B uses prescribed fire, as well as other treatments to meet fire and fuels management objectives found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect adverse impacts to special status plant species under Alterative B are expected to be less than under Alternative A.

Livestock and Native Ungulate Grazing. Under Alternative B, the planning area could be open to livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary, nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with an emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coalmines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources. Salt or mineral supplements are located a minimum of ½ mile away from water resources, riparian areas, and areas with special status plant species. Range improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities are not allowed within ½ mile of special status plant species populations unless they are determined to benefit that species.

Alternative B generally allows livestock grazing over the same area identified under Alternative A; however, areas identified for the protection of specific resource values would be closed under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands,

including riparian areas, wetlands, and areas of special status plant species. Increased protection of riparian and wetland resources benefits special status plants species that occur in these habitats, including potential habitats for Ute ladies'-tresses. The anticipated adverse impacts to special status plant species from current livestock grazing are not anticipated around known locations of special status plant species; however, due to stricter management of livestock grazing, direct and indirect adverse impacts to unknown locations of special status plants under Alternative B are expected to be less than under Alternative A.

OHV Use. Under Alternative B, more area is designated as closed to OHV use (33,896 acres). No off-trail travel is allowed. Riparian and wetland areas are designated closed to OHV use except for designated road crossings. Areas with special status plant species are designated closed to vehicle use, and unpaved roads are not allowed within ¼ mile of areas with special status plant species. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least adverse impacts to known and unknown populations of special status plant species compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile and vehicle and hand applications are not allowed within ¼ mile of special status plant species. Chemicals are mixed a minimum of ¼ mile from sensitive resources, including special status plant populations. In addition to the requirement for certified weed-free seed and mulch in restoration projects, Alternative B also requires the use of certified weed-free forage and feeds for livestock supplementation to prevent the introduction or establishment of new weed areas, which may affect special status plant populations.

The greater the distance from riparian areas, wetlands, and special status plant populations that chemicals are applied or mixed, the lesser the potential for impacts associated with vegetation removal, soil disturbances, or chemical spills to these resources. Therefore, direct impacts to special status plant species associated with application of INNS control methods are anticipated to be less for Alternative B than Alternative A. The weed-free seed, mulch, forage and feed requirements provide indirect benefits for special status plants.

Proactive Management Actions. Under Alternative B, known locations of special status plant species are protected and closed to surface-disturbing activities. All populations of *Physaria dornii* have an NSO restriction for fluid minerals. Areas where special status plants are known to occur are ROW exclusion areas. Disruptive activities proposed for potential habitats of special status plant species on federal land or on split-estate lands require surveys for the plant species prior to approving any project or activity. Should a species be found, all disruptive activities are halted. Surface-disturbing activities are prohibited in potential habitat areas for special status plant species. Vegetation treatments are allowed in potential habitat areas for special status plant species only when they benefit the species.

Under Alternative B, special status plant species' habitats and cushion plant communities are designated ACECs; special status plant populations and cushion plant communities designated as ACECs also are designated Research Natural Areas (RNAs). Special status plant species benefit from ACEC designations, and RNA designation provides additional protection to the ACEC designation. In addition to the Raymond Mountain ACEC, under Alternative B, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife, cultural resources). Management actions that protect special status plant species' habitats and populations, as well as other resources, provide direct and indirect beneficial impacts to special status plant species. Alternative B provides the most protection to special status plants species of all alternatives.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short- and long-term surface disturbances from BLM management actions are the second highest of all alternatives. Under Alternative C, there are approximately 41,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard

to potential surface disturbance associated with mineral resources and the protection and mitigation to address these activities. Restrictions to oil- and gas-related activities and reclamation of surface disturbance requirements are similar to Alternative A. Reclamation of surface disturbance is the same as Alternative A. Direct and indirect adverse impacts to special status plant species from surface disturbance activities under Alternative C are anticipated to be similar to Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed during fire suppression unless private or public habitable structures or industrial facilities are at risk. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed in special status plant species populations (similar to Alternative A), but is allowed elsewhere in the planning area. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of , some direct impacts are reduced. However, by not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to special status plant species.

Livestock and Native Ungulate Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small, isolated tracts currently not permitted or leased for grazing as well as other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows are available for livestock grazing. Grazing system and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guides) other resource values. Location of salt or mineral supplements and range improvement projects are the same as Alternative A.

The anticipated adverse impacts to special status plant species from livestock grazing under Alternative C are not anticipated around known locations of special status plant species; however, due to a greater emphasis on livestock values, which minimizes protection of riparian and wetland resources, direct and indirect adverse impacts to unknown locations of special status plants under Alternative C are expected to be slightly greater than under Alternative A.

OHV Use. Under Alternative C, approximately 32,787 acres are closed to OHV use. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. Similar to Alternative A, there are no specific measures to protect special status plant species from dust from unpaved roads or motor vehicles. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHV use under Alternative C are anticipated to produce slightly less adverse impacts to populations of special status plant species compared to Alternative A.

INNS. For aerial-, hand- and vehicle-application of herbicides, Alternative C restrictions are the same as for Alternative A, except that buffer areas for mixing chemicals are a minimum of 100 feet (400 feet less of a distance than Alternative A) from sensitive resources, including riparian areas, wetlands, and special status plant populations. The lesser the distance from sensitive resources that chemicals are mixed, the greater the potential for spills to adversely impact these areas. In addition to the requirement for certified weed-free seed and mulch in restoration projects, Alternative C also recommends the use of certified weed-free forage and feeds to prevent the introduction and establishment of new weed areas, which can indirectly benefit special status plant species.

Proactive Management Actions. Alternative C is the same as Alternative A, except that NSO restrictions for fluid minerals are removed from populations of *Physaria dornii*. Unlike the other three alternatives, no surveys for special status plant species are required, except for federally listed, proposed, or candidate species prior to approving any project or activity. No limitations are placed on surface-disturbing activities. Vegetation treatments in potential habitat areas for special status plant species are conducted to produce a desired plant community to benefit all resources complying with sensitive species policy (not all vegetation treatments benefit special status plant species). Under Alternative C, there are no special status plant species populations and cushion plant communities designated as ACECs. The area within the current Raymond Mountain ACEC is not designated as an ACEC. Alternative C provides

minimum protection to known and unknown populations of special status plants compared with other alternatives.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, the second lowest acreage of short-term and long-term disturbance is anticipated in the planning area from BLM management actions compared to Alternative A. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil- and gas-leasing consideration (slightly less than for Alternative A), all of which is subject to the terms and conditions of the standard lease form. Approximately 75 percent of the acreage also is subject to moderate constraints (greater then Alternative A) and 21 percent is subject to major constraints.

Under Alternative D, protection and mitigation to address surface-disturbing activities is the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances and to reduce impacts and fragmentation of habitats. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil- and gas-related activities are restricted on slopes greater than 25 percent and NSO restrictions for fluid minerals are implemented for slopes greater than 40 percent, as in Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater. Any disturbance in areas with 20 percent or greater slopes would require additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided and require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as Alternative B. Direct and indirect adverse impacts to special status plant species from surface-disturbance activities under Alternative D are anticipated to be less than under alternatives A and C, but more than under Alternative B.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows an AMR as identified in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). This includes suppression of fires to provide first for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high-density urban or industrial interface with intermingled BLM-administered lands, then for allowing achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). During fire-suppression activities, soil disturbances on public lands are not allowed without consent from the authorized officer. Use of fire-suppression chemicals is managed similar to Alternative A and use of prescribed fire, as well as chemical, biological, and mechanical treatments, is similar to Alternative B. Prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role into the ecosystem to meet fire and fuels resource management objectives, same as Alternative A, which could improve habitat and result in a beneficial impact for special status plant species.

Livestock and Native Ungulate Grazing. Alternative D is similar to Alternative A, except livestock grazing on small, isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Salt or mineral supplements are located a minimum of ¼ mile away from special status plant species. Range-improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities, are not allowed within known special status plant species populations (similar to Alternative A). Buffers are based on resource concerns

on a case-by-case basis. Under Alternative D, there is greater protection and therefore, less direct and indirect adverse impacts to areas of special status plant species than under Alternative A.

OHV Use. Alternative D closes the second highest number of acres to OHV use (33,037). No new unpaved roads are allowed within 250 feet of areas with special status plant species unless NEPA analysis determines the road would not adversely impact the species. In areas with special status plant species, all vehicles, including emergency vehicles, are restricted to existing roads and trails (the authorized officer has the discretion to lift this requirement in an emergency situation). The anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use are anticipated to produce slightly less adverse impacts to populations of special status plant species compared to Alternative A.

INNS. Similar to Alternative B, this alternative requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock supplementation. These actions help prevent the introduction and establishment of new weed areas, which can indirectly benefit special status plant species.

Proactive Management Actions. Under Alternative D, surface-disturbing restrictions in known locations of special status plant species are similar to Alternative B, except that NSO restrictions for fluid minerals are removed from populations of *Physaria dornii*. Surveys for special status plant species and protection measures are similar to Alternative A. Vegetation treatments in potential habitat areas for special status plant species could be conducted on a case-by-case basis when they would benefit these species.

Under Alternative D, special status plant species habitats and cushion plant communities are designated ACECs (similar to Alternative B), but special status plant populations and cushion plant communities designated ACECs are not designated as RNAs. In addition to the Raymond Mountain ACEC, under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife, cultural resources), but these would not be as extensive as under Alternative B. Alternative D provides greater protection to special status plants compared with alternatives A and C, but less protection than the maximum provided by Alternative B.

4.4.6.3 Conclusion

Fewer acres are subject to surface-disturbing activities and habitat fragmentation under Alternative B, followed by alternatives D and C. Alternatives B and D also have more provisions to protect sensitive soils and habitats, such as riparian areas, and include more management restrictions that would benefit special status plant species. Alternative A has the highest potential to damage sensitive soils and other unique habitats because it has the highest amount of surface disturbance, potentially resulting in direct and indirect adverse impacts to special status plant species. Alternative B provides the greatest protection from direct adverse impacts associated with livestock grazing and management of INNS, followed by alternatives D and C.

Special status plants receive more indirect benefits from management for other resources, such as special status wildlife species and cultural resources, under alternatives B and D. Alternative B, followed by Alternative D, sets aside the most land for new MAs, which could indirectly benefit special status plants. Based on the acreage of surface disturbance and the acreage protected from habitat fragmentation, alternatives with the least to most potential adverse impacts to special status plant species are alternatives B, D, C, and A.

4.4.7 Special Status Species – Fish

Actions that could occur through implementing each alternative could impact special status fish species. This section describes the impacts of each alternative on special status fish species in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

No federally listed fish species occur in the planning area; however, the federally endangered bonytail, Colorado pikeminnow, humpback chub, and razorback sucker occur in the Green River and Colorado River systems downstream of the planning area and could be impacted by management activities in the part of the planning area comprising the Colorado River watershed (see Map 7). In addition, seven BLM sensitive species occur in the planning area: roundtail chub, leatherside chub, bluehead sucker, flannelmouth sucker, Colorado River cutthroat trout, Bonneville cutthroat trout, and fine-spotted Snake River cutthroat trout. The impacts to BLM sensitive species are similar to those described for Fish and Wildlife Resources – Fish and focus on water quality, water quantity, and riparian-area conditions. The potential impacts of each alternative on the federally listed species occurring downstream of the planning area focus on water depletion.

Adverse impacts to the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker could occur through depletion of water in the Green River and Colorado River systems, resulting from water use in a portion (i.e., Colorado River watershed) of the planning area. Adverse impacts to these federally listed fish species also could occur through degradation of water quality in the Green River and Colorado River systems. Activities in the Colorado River watershed portion of the planning area that would measurably reduce the quantity or quality of water in downstream reaches of the Green River and Colorado River are considered indirect adverse impacts. Water depletions are considered a long-term adverse impact because implementation of management actions projected to cause water depletion is anticipated to occur over the life of the plan. Degradation of water quality is considered a short-term adverse impact because individual surface-disturbing activities are anticipated to occur over a relatively short period (less than 5 years).

4.4.7.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Water consumption in the Green River watershed may adversely impact surface water quantity in the larger Colorado River system. Water depletion analyses are based on the assumption that all water used for drilling and completion of wells and evaporation from reservoirs within the Green River watershed contribute to surface flows of the Colorado River or its tributaries.
- For Green River and Colorado River systems species, the area evaluated includes the portion of the planning area drained by the Colorado River, as well as areas of the Green River and Colorado River systems downstream of the planning area.
- The number of projected oil and gas wells within the Colorado River watershed varies by alternative and is estimated based on the potential for oil and gas development within the watershed.
- Based on assumptions for water use during well drilling, completion, and dust abatement, as well as for impoundment size and evaporation rates, each conventional oil and gas well uses approximately 2 acre-feet of water over the life of the plan.
- Produced water from CBNG drilling is assumed to have a negligible influence on surface water quantity and quality in the Colorado River watershed.
- Each livestock well or spring maintains an average of two stock troughs approximately 10 feet in diameter (79 square feet [ft^2]) each, for a per-project surface area of 157 ft^2.

4.4.7.2 Analysis of Alternatives

Allowable uses and management actions that could indirectly impact special status fish species include all surface-disturbing activities with the potential to degrade water quality in the Green and Colorado rivers and water-development actions able to deplete water quantity in the Colorado River system. The types of impacts projected to impact water quality and quantity in the Colorado River watershed are anticipated to be common to all alternatives and, therefore, are discussed in the following section. The intensity of impacts to water quality and quantity are anticipated to vary by alternatives and are described in subsequent sections. See the Water section and the Fish and Wildlife Resources – Fish section of this chapter for additional detail on impacts to water quality and water quantity.

Impacts Common to All Alternatives

Reduced water flow in the Green River and Colorado River can lead to adverse impacts on the ecosystems that support the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. Changes in flow regimes (i.e., perennial flows) may impact these species by altering their use of spawning, rearing, and reproduction. Impacts could include loss of habitat and disruption of migration movements. The Colorado River Compact (1922) provides for the apportionment of the use of the waters of the Colorado River system, of which Wyoming is a part. The Colorado River System Salinity Control Act (P.L. 93-320) controls the salinity of water delivered to users in the United States and Mexico. Activities that lead to degradation of riparian areas adversely impact all special status fish species' habitats.

Water Quality

The potential to adversely impact water quality in the planning area is primarily a function of surface-disturbing activities and associated soil erosion, particularly on soils highly susceptible to water erosion. Actions removing vegetation and disturbing soil, thereby increasing the potential for offsite erosion and sediment delivery into the stream system, are primarily anticipated to be surface-disturbing activities. Appendix M provides data regarding surface-disturbance acreage and RFD actions by alternative. Other actions, including concentration of livestock, fire and fuels management, OHV use, and reclamation of disturbed areas also are anticipated to remove or reduce vegetation and disturb soil, but are expected to have less potential to degrade water quality in the Colorado River watershed.

Under all alternatives, sedimentation would be minimized by implementing appropriate BMPs and through the development and implementation of Erosion, Revegetation, and Reclamation Plans (ERRPs). In general, produced water from CBNG wells can result in higher volumes of water, as compared with conventional natural gas wells, and is relatively high quality in the planning area because it is derived from formations closer to the recharge areas. Negligible adverse impacts to surface water quality from CBNG development are anticipated under any alternative after implementing BMPs and other mitigation measures. Please refer to the Water section earlier in this chapter for more information about potential impacts to surface water quality.

Water Quantity

Development of oil and gas wells can impact surface and groundwater quantity through water use associated with well drilling and completion, as well as through the surface disposal of produced water from CBNG wells. The amount of water used for drilling and completion of wells, including water for dust abatement and other post-drilling activities, is relatively similar for most types of wells. Water used for well construction and completion is assumed to reduce the amount of water available for use in the Green River and Colorado River downstream of the planning area. The volume of produced water from CBNG wells impacting surface and groundwater quantity depends on the amount of water disposed into

surface waters, reinjected, or disposed into impoundments. The contribution of produced water from CBNG wells is anticipated to be negligible compared to projected water depletions.

Projected development of springs and wells for livestock are anticipated to deplete water in the Colorado River watershed. The number of wells and springs for livestock is the same under all alternatives. Table 4-10 summarizes the average annual depletion for each water-depleting action by alternative.

Table 4-10. BLM Actions and Potential Water Depletions in the Colorado River Watershed During Implementation of the Kemmerer Field Office Resource Management Plan

Alternative	Action	Number	Average Annual Depletion (acre-feet)
A	Oil and Gas Drilling	963	96.3
	Livestock Water Wells and Springs	41	0.6
	Total		**96.9**
B	Oil and Gas Drilling	585	58.5
	Livestock Water Wells and Springs	41	0.6
	Total		**59.1**
C	Oil and Gas Drilling	971	97.1
	Livestock Water Wells and Springs	41	0.6
	Total		**97.7**
D *(Preferred Alternative)*	Oil and Gas Drilling	963	96.3
	Livestock Water Wells and Springs	41	0.6
	Total		**96.9**

Note: Due to the programmatic nature of RMP alternatives, key assumptions made for calculating projected water depletion in the Colorado River watershed over the life of the RMP include the following:

(1) The Colorado River watershed comprises 58 percent of the planning area.
(2) All Moxa Arch and CBNG coalbed natural gas wells and 58 percent of the Overthrust Belt wells are within the Colorado River watershed.
(3) Livestock wells and springs are evenly distributed throughout the planning area.
(4) All wells and springs projected for development over the life of the RMP are constructed and completed in year 1.
(5) Water depletions associated with conventional oil and gas drilling are calculated using an average depletion of 2 acre-feet per well occurring in the Colorado River watershed by alternative. Oil and gas well numbers were derived from the RFD Scenario for Oil and Gas (BLM 2006b).
(6) Potential water depletion for fire management is not included in calculations due to the nonpredictive nature of unplanned fire and the negligible water depletion associated with planned fire.

CBNG coalbed natural gas
RFD Reasonable Foreseeable Development
RMP Resource Management Plan

Alternative A

Water Quality

Alternative A has the greatest potential to adversely impact special status fish species because this alternative has the largest areas administratively available for mineral development and the least restrictions on surface-disturbing activities. Under Alternative A, the Raymond Mountain ACEC is retained to protect Bonneville cutthroat trout habitats; no other special designations are implemented. Alternative A manages 13 waterway segments to protect the free-flowing values of these rivers and creeks. Alternative A does not apply management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitat for the Snake River cutthroat trout. Alternative A provides for preserving the natural functions of riparian areas by avoiding surface-disturbing activities within 500 feet wetlands, riparian areas, aquatic habitats, and 100-year floodplains. Alternative A does not actively address human-caused barriers to fish movement.

Water Quantity

Alternative A imposes the fewest restrictions on activities that remove vegetation and compact soils, resulting in increased storm water runoff entering streams. This alternative is projected to have the second highest number of federal wells drilled (1,012 wells). The disposal of CBNG-produced water is subject to local, state, and federal laws and regulations. Alternative A has the second greatest water depletion and, therefore, the second greatest adverse impact on special status fish species.

Alternative B

Water Quality

Alternative B proposes less surface disturbance over the long term compared with Alternative A and the least of all alternatives. Alternative B restrictions on surface-disturbing activities and the prohibition of discharging produced waters to streams are expected to result in the least adverse impacts to Class 1 and 2 streams relative to Alternative A and other action alternatives.

Under Alternative B, the Dry Fork, Upper Tributary, and Lower Tributary watersheds are designated ACECs to protect Bonneville cutthroat trout and leatherside chub habitats. These designations result in greater beneficial impacts for these species than Alternative A, which does not designate these areas as ACECs. Alternative B also recommends 13 eligible waterways as suitable for inclusion in the national wild and scenic rivers system. Alternative B applies management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitat for the Snake River cutthroat trout. Alternative B's management of human-caused barriers to fish movement, including, but not limited to irrigation diversions, road crossings, and damaged culverts, results in greater beneficial impacts to special status fish species than Alternative A, especially with respect to the three subspecies of cutthroat trout, by providing for genetic diversity and population stability. An increase in the buffer around riparian areas, and the fact that this buffer is an exclusion area, results in greater beneficial impacts to special status fish species than Alternative A.

Water Quantity

Alternative B results in the least amount of change to surface water quantity because the fewest federal wells are drilled (608 wells), disposal of produced waters to streams is prohibited, and more restrictions on surface-disturbing activities are implemented than under Alternative A or the other action alternatives. Alternative B has the least water depletion and, therefore, the least adverse impact to special status fish species.

Alternative C

Water Quality

Alternative C has similar potential to degrade water quality as Alternative A through increased sedimentation due to having the similar restrictions on surface-disturbing activities. Alternative C's proposed restrictions and reclamation requirements are anticipated to result in similar adverse impacts to water quality as Alternative A.

Alternative C does not retain the Raymond Mountain ACEC and does not designate any other areas as ACECs to protect special status fish species' habitats. Alternative C does not apply management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitats for the Snake River cutthroat trout, similar to Alternative A. The lack of specific protections for watersheds results in least beneficial impacts to special status fish species' habitats of all alternatives, similar to Alternative A. Beneficial impacts from riparian area protections are similar to Alternative A. Management of human-caused barriers to fish movement under Alternative C is similar to Alternative A, therefore resulting in similar impacts.

Water Quantity

Alternative C results in the greatest amount of change to surface water quantity because the most federal wells are drilled (1,020 wells) and disposal of produced water is allowed providing it meets local, state, and federal laws and regulations, similar to Alternative A. Alternative C has slightly greater water depletion (0.2 acre-feet more) than Alternative A and is anticipated to result in similar adverse impacts to special status fish species as Alternative A.

Alternative D (Preferred Alternative)

Water Quality

Alternative D has the second lowest acreage administratively available to mineral leasing with standard stipulations and the highest acreage administratively available with moderate constraints. The anticipated impacts to water quality for Alternative D are anticipated to be similar to, but less than, Alternative A.

Alternative D retains the Raymond Mountain ACEC and recommends Huff Creek and Raymond Creek for inclusion in the national wild and scenic rivers system. These designations may benefit fisheries in general and provide more management direction to protect existing resource values than Alternative A. This type of management results in greater beneficial impacts to fisheries habitats than Alternative A, but less than Alternative B. Alternative D applies management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitats for the Snake River cutthroat trout, similar to Alternative B. Similar to Alternative A, Alternative D avoids surface-disturbing activities within 500 feet of riparian areas. However, Alternative D provides additional protection of riparian areas than Alternative A to specifically improve stream water quality, resulting in greater beneficial impacts to special status fish species than Alternative A. Impacts to special status fish species based on management of human-caused barriers to fish movement under Alternative D are the same as Alternative B.

Water Quantity

Although the number of federal wells drilled under Alternative D is similar to Alternative A, Alternative D results in fewer adverse impacts to fish habitats because Alternative D implements more restrictions by requiring a BLM-approved produced water disposal plan. Impacts from water depletion are similar to Alternative A.

4.4.7.3 Conclusion

Alternative B has the least impact on water quality because it has the lowest levels of surface disturbance and the greatest protection for erodible soils among all the alternatives. According to Appendix M, alternatives A and C are anticipated to contribute the most sediment and the most runoff to surface water and, therefore, could have the most adverse impacts on water quality.

Regarding water quantity, Alternative C has the greatest water depletion and alternatives A and D have slightly less (0.2 acre-feet less) water depletion and, therefore, are likely to have the greatest potential to adversely impact special status fish in the Colorado River. Anticipated adverse impacts to water quantity from Alternative B are anticipated to be the least (59.1 acre-feet).

Based on the above anticipated adverse and beneficial impacts, Alternative B is anticipated to have the least adverse impact to special status fish species. Alternatives A and C are anticipated to have the greatest adverse impact to special status fish species.

4.4.8 Special Status Species – Wildlife

Actions that could occur through implementing each alternative could impact special status wildlife species. This section describes the impacts of each alternative on special status wildlife in terms of direct, indirect, short-term, and long-term impacts. Impacts also are described as beneficial or adverse to special

status wildlife. Refer to Maps 24 through 26 for special status wildlife species and Map 21 for vegetation.

Direct impacts to special status wildlife result from the direct loss of critical habitats or a key habitat feature, such as a nest site or lek area, or from the immediate loss of life. Special status wildlife also can be directly disturbed by human activities, potentially causing them to abandon a nest, lek, or home range. It has been widely documented that disturbance during sensitive periods (e.g., winter, nesting) leads to lower recruitment rates and higher mortalities, which adversely impact special status species wildlife.

Habitat loss and fragmentation are assumed to adversely impact special status wildlife. These conditions are described in more detail in the introductions to Biological Resources in this chapter and in Chapter 3. Habitat loss generally is a direct impact; i.e., the individual or population is immediately impacted. The impacts of habitat fragmentation, however, operate indirectly through mechanisms, such as population isolation (Saunders et al. 1991); edge impacts, such as increased nest predation and parasitism (Paton 1994; Faaborg et al. 1995); encroachment of INNS; and disruption of migration patterns.

Indirect impacts to special status wildlife occur by changing habitat characteristics or quality, which can ultimately result in changes in migration patterns, habitat use, carrying capacity, and long-term population viability. Indirect impacts to habitats for special status wildlife also could occur when specific actions change the habitat in a way that makes it unsuitable for future habitation.

Disturbance impacts could range from short-term displacement and shifts in activities to long-term abandonment of home range (Miller et al. 1998; Yarmaloy et al. 1988; Connelly et al. 2000). For the purpose of this analysis, short-term impacts (up to 5 years) to special status wildlife are those activities that an individual or species responds to immediately, but does not impact the population viability of the species. Long-term impacts (more than 5 years) are those that cause an individual or species to permanently abandon an area or that impact the population viability and survival of the species.

4.4.8.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- To focus the discussion for a more specific analysis of impacts, special status wildlife species are grouped according to statutory wildlife categories, as described in Chapter 3.
- Impacts to special status wildlife species are primarily based on potential impacts to habitats that the BLM manages.
- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for species status wildlife species are often lacking, or habitat types affected by surface-disturbing activities cannot be predicted.
- Actions that would adversely impact or benefit one species would have similar impacts on other species using the same habitats.
- Public concern for special status species will likely increase over the planning period due to increasing concerns over growth and development on habitats containing these species.
- Over the life of the plan, some species that are currently considered sensitive, or not formally included in BLM's sensitive species list, may be listed under the ESA. Some currently listed species may be delisted during the life of the plan. Most species that are delisted or downgraded from federally proposed or candidate status will be included on the BLM sensitive species list.
- The more acreage protected by a buffer, the greater the benefit to the targeted species.
- In terms of buffers, prohibit means no activity or impact will be allowed during a specific time period or a designated habitat area, unless specific biological exception conditions are met. Avoid means to utilize guidance for avoidance when possible.

- Prohibiting all nonbeneficial ground disturbance and disruptive activities in greater sage-grouse habitats would be providing a higher level of protection for greater sage-grouse than avoiding these activities.
- Under all alternatives, recommendations by local Sage-Grouse Working Groups for improving and maintaining greater sage-grouse habitats would be adopted if budget and policy allow.
- Management of sagebrush habitats would follow the *BLM National Sage-Grouse Habitat Conservation Strategy* (BLM 2005c). Using these guidelines, greater sage-grouse would serve as an umbrella species for all sagebrush-dependent species.
- The more sagebrush acreage protected, the greater the benefit to greater sage-grouse and other sagebrush-dependent species.
- Measures to protect greater sage-grouse will benefit all sagebrush-dependent species.
- Short- and long-term surface disturbance (see Appendix M) are assumed to occur in vegetation types in proportion to the availability of these vegetation types in the planning area. Impact acreages for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- Because of the migratory nature and relative mobility of some special status wildlife species (e.g., waterfowl, neotropical migrants, and raptors), these species also will be impacted by actions on non-BLM-administered lands. Adverse impacts to wildlife during different life stages on non-BLM-administered lands can reduce populations regardless of BLM protective measures.
- Potential impacts are typically described for Alternative A relative to surface-disturbing and other activities anticipated with this alternative. Potential impacts from action alternatives are typically described in less detail and relative to impacts anticipated from Alternative A.
- The BLM can minimize disturbance impacts to special status wildlife by limiting access to nesting, breeding, and brood-rearing sites. Surface disturbance can be controlled through three types of restrictions: (1) NSO for fluid minerals, which prohibits physical presence; (2) CSU, which limits surface use unless there is a documented plan for mitigation; and (3) TLS, which prohibits surface use during specified periods.
- The analysis of special status wildlife species in planning area watersheds focuses on changes in water quantity in the planning area as the primary indirect impact of resource management actions on the watershed species. Refer to the Special Status Species – Fish section for more detail on these analyses and to the Water section for more information about impacts to water quality and water quantity in the planning area. The two main watersheds in the planning area are the Colorado River and the Bear River watersheds.
- For analysis purposes, it is assumed that water use in the planning area may adversely impact surface water quantity in the planning area watersheds. Water depletion analyses are based on the assumption that all water used for impoundments or drilling and completion of wells within the planning area would have contributed to the surface flows of the pertinent watershed. The Colorado River watershed is the only one that is currently analyzed for water depletions.
- The area evaluated for possible impacts to most special status wildlife includes the entire area within the boundaries of the planning area. For the Colorado and Bear River watershed species, the area evaluated includes the portion of the planning area drained by the rivers and their tributaries, as well as areas of the watersheds downstream of the planning area.

4.4.8.2 Analysis of Alternatives

The analysis of alternatives for special status wildlife species does not repeat the allowable uses and management actions proposed for each alternative and described in Chapter 2. Moreover, the types of impacts anticipated for special status wildlife species are similar in nature to the Impacts Common to All Alternatives described for Fish and Wildlife Resources – Wildlife in this chapter; therefore, an extensive description of those impacts is not repeated in this section.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status wildlife species as a result of the various alternatives are similar. Habitats are anticipated to be lost, degraded, reclaimed, protected, enhanced, and fragmented by management actions and allowable uses under all alternatives, although the intensity of impacts is anticipated to vary by alternative. Refer to Table 4-1 for the anticipated short- and long-term surface disturbance from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M.

Surface-disturbing Activities. Because the precise location of surface-disturbing activities is unknown and because special status wildlife species utilize more than one vegetation type, impacts to special status wildlife from construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, and vegetation treatments are anticipated to be a function of the amount, density, type, location, and frequency of short- and long-term disturbance. The timing and type of reclamation also is anticipated to impact special status wildlife species. Long-term surface disturbance acreage identified in Table 4-1 accounts for reclamation of some lands following short-term disturbance. Although reclamation reduces long-term surface disturbance acreage, the location of permanent facilities (e.g., roads, well pads, etc.) adjacent to reclaimed areas can reduce the utility of reclaimed habitats. For example, the greater the density of permanent facilities in an area, the more the habitat is fragmented and the greater the adverse impact anticipated for special status wildlife. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of surface-disturbing activities.

The bald eagle is a federally threatened species known to occur within the planning area. Currently, one bald eagle nest and two communal roosts are documented within the planning area. As indicated in Table 2-3, activities and habitat alterations that disturb bald eagles are restricted within three zones from within ½ mile to 2½ miles. Bald eagles can be adversely impacted by disturbance or habitat changes at important winter roosts; however, all alternatives establish NSO buffers for fluid minerals around all bald eagle roosts.

Mountain plover is a BLM sensitive species known to occur within the planning area. A TLS restriction is in place (from April 10 through July 10) to protect breeding and nesting habitats for all alternatives. Actions resulting in the loss, degradation, or fragmentation of suitable habitats (e.g., shortgrass prairie, prairie dog towns) and surface disturbance could impact mountain plover habitats. Prior to implementing any vegetation improvement projects that may disturb potentially suitable mountain plover nesting habitats, the conservation strategies outlined in the *Mountain Plover Biological Evaluation* (BLM 2005l) and the *Mountain Plover Project Screen* (BLM et al. 2004) are implemented in order to minimize direct impacts to nesting mountain plovers and their occupied habitats (BLM 2005l).

Wildlife-disturbing Activities. These are authorized activities that may cause displacement of or excessive stress to wildlife during critical life stages. Wildlife-disturbing activities include human presence, noise, and activities using motorized vehicles or equipment. Each of these activities is anticipated to occur under all alternatives and impact special status wildlife species. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of wildlife-disturbing activities. The precise location of wildlife-disturbing activities is not predictable at this level of analysis; therefore, these activities are evaluated during project-specific NEPA evaluations prior to project authorization.

Proactive Management Actions. Select management actions and allowable uses are anticipated to benefit special status wildlife species by promoting individual species and their habitats or by restricting activities of other resource programs (e.g., mineral development, livestock grazing,). Collectively, these actions are described in this section as proactive management actions and include managing vegetation communities and associated wildlife habitats, restricting certain types of development, designating ACECs, managing habitat fragmentation, and developing and protecting water source and associated habitats. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of proactive management actions.

All alternatives provide some degree of protection to streams, wells, springs, or other water sources by prohibiting or managing surface disturbance within varying distances from the water sources. Those alternatives providing the greatest protection of water sources beneficial to special status wildlife are anticipated to have the greatest benefit to special status wildlife. Special status wildlife species that use water sources and riparian and wetland habitats within the planning area benefit from management actions common to all alternatives that promote the development and enhancement of water sources. Developing water sources for wildlife and livestock are anticipated to benefit the distribution and health of special status wildlife species within the planning area.

All alternatives continue to manage public lands within the Raymond Mountain WSA in a manner that does not impair its suitability for preservation as a wilderness until the U.S. Congress determines its wilderness designation, benefiting special status wildlife species. The BLM Handbook H-8550-1, *Interim Management Policy for Lands Under Wilderness Review*, provides additional information on managing these types of areas.

Impacts to special status wildlife species generally are described in this section in terms of anticipated surface disturbance, amount of habitat potentially protected from habitat fragmentation, amount of land protected by buffers around nests and leks, amount of water depletion to the Colorado River system, and the potential adverse impacts from other resource program actions. Table 4-11 summarizes select conservation measures anticipated to offset some of the impacts to habitats. In addition, Table 2-3 identifies the acreage by alternative of lands restricted or administratively unavailable to mineral development. These restrictions are anticipated to benefit special status species wildlife in the area.

Alternative A

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Measures included in Alternative A that may minimize impacts to grizzly bear habitats include seasonal closures of big game winter ranges, seasonal no surface disturbance restrictions around raptor nests, protection of elk calving areas, and limitations of geophysical operations and other surface disturbances around greater sage-grouse leks.

Furbearing Animals

Under Alternative A, there are no specific management actions for Canada lynx; however, management actions that protect the Canada lynx habitats and their prey (primarily snowshoe hares) are anticipated to result in beneficial impacts for Canada lynx. For example, prohibition of surface disturbance within ¾ mile of active raptor nests conserves Canada lynx habitats during the TLS where these habitats overlap; however, this TLS would not provide long-term protection to Canada lynx. Forest management in aspen

and coniferous forests could adversely impact Canada lynx habitats by creating different patterns of forest stand type other than the patchwork of early and late succession conditions preferred by Canada lynx (BLM 2005f). Reduction of large woody debris also could result in adverse impacts to Canada lynx by potentially eliminating denning sites, reducing kitten survival, and reducing availability of prey species. Alternative A does not address old growth forest areas in the planning area. Timber removal does not exceed the annual sustainable yield capacity under Alternative A.

Livestock grazing in riparian areas can alter the structure and composition of the areas on which Canada lynx prey species rely on (BLM 2005f). Proper grazing management and implementation of rangeland improvement projects can sustain or improve the health of riparian and wetland areas, benefiting Canada lynx prey species. Under Alternative A, placement of supplements in riparian and wetland communities is considered on a case-by-case basis and improvement of range conditions is focused on higher priority allotments (Category I). Management actions include measures to preserve, protect, and restore natural functions of riparian and wetland communities, benefiting these species.

Predatory Animals

Under Alternative A, there are no specific management actions for gray wolves; however, management actions that protect the habitat gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves. Refer to the Fish and Wildlife Resources – Wildlife section of this chapter for more detail on impacts to big game.

Under Alternative A, management actions that may directly or indirectly minimize impacts to gray wolves include seasonal no surface disturbance buffers around active raptor nests and the four areas of NSO for fluid minerals: bald eagle winter roosts, the Bridger Antelope Trap area, sensitive plant locations, and the ¼-mile buffer of perennial streams in the Raymond Mountain ACEC. These restrictions would benefit wolves only where the habitats overlap. Developing roads under Alternative A is primarily for oil and gas development. Surface disturbance from roads totals 2,256 acres in the short term. Alternative A does not address habitat fragmentation or migration and travel corridors for big game or special status species. Alternative A closes big game winter ranges to minimize stress to these species when needed. Alternative A may result in adverse and beneficial impacts to gray wolves.

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in loss, degradation, and fragmentation of sagebrush habitat (Table 4-1). Specifically, mineral and energy development has been identified as a potential cause of declining greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Naugle et al. (2006) suggest that activities associated with CBNG wells adversely impact greater sage-grouse; male greater sage-grouse avoid areas with CBNG development. Alternative A does not provide specific guidance or management actions for the prevention of habitat loss and fragmentation. For example, developing minerals and wind-energy facilities on BLM-administered land under Alternative A could result in long-term adverse impacts to greater sage-grouse by fragmenting sagebrush habitats. Alternative A makes no specific decisions regarding wind-energy development in the planning area. Reclamation of surface disturbance begins within 1 year of the abandonment of operations and reestablishes vegetation within 3 years of initial seeding. For oil and gas activities, reclamation is completed according to the surface use plan. Overall, surface disturbance in sagebrush habitats under Alternative A is anticipated to adversely impact the greater sage-grouse.

Table 4-11. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife

Actions Affecting SSS-Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Raptors – ½-mile buffer	BLM-Administered Surface	3,769	0	3,769	0
	BLM-Administered Mineral Estate	3,065	0	3,065	0
Raptors – ¾-mile buffer	BLM-Administered Surface	37,689	0	37,689	37,689
	BLM-Administered Mineral Estate	40,878	0	40,878	40,878
Raptors – 1-mile buffer	BLM-Administered Surface	74,599	0	74,599	74,599
	BLM-Administered Mineral Estate	71,531	0	71,531	71,531
Raptors – 1½-mile buffer	BLM-Administered Surface	0	245,978	0	0
	BLM-Administered Mineral Estate	0	249,154	0	0
Bald eagle winter roost area	BLM-Administered Surface	NSO	NSO	NSO	NSO
Bald eagle winter roost buffer (November 1 to April 1)	BLM-Administered Surface	1 mile	1 mile	1 mile	1 mile
Bald eagle active and alternative nest buffer (year-round)	BLM-Administered Surface	½ mile	½ mile	½ mile	½ mile
Bald eagle nest buffer (February 1 to August 15)	BLM-Administered Surface	½ to 1 mile	½ to 1 mile	½ to 1 mile	½ to 1 mile
Bald eagle nest buffer (foraging or concentration areas)	BLM-Administered Surface	2½ miles	2½ miles	2½ miles	2½ miles
Greater Sage-Grouse Leks Protective Buffers	BLM-Administered Surface	28,599	28,599	28,599	28,599
	BLM-Administered Minerals	30,442	30,442	30,442	30,442
Greater Sage-Grouse Nesting and Early Brood-Rearing Habitat Buffers	BLM-Administered Surface	702,360	702,360	702,360	702,360
	BLM-Administered Minerals	745,623	745,623	745,623	745,623
Habitat Fragmentation	BLM-Administered Surface	NA	Avoided to no more than 3% of available habitat	Avoided	Avoided
High Profile Structures	BLM-Administered Surface	NA	Prohibited with 1 mile of occupied habitat	Allowed with 1 mile of occupied habitat	Avoided with 1 mile of occupied habitat
Use of certified weed-free forage and feeds	BLM-Administered Surface	NA	Required	Recommended	Required
Use of certified weed-free seed and mulch	BLM-Administered Surface	NA	Required	Recommended	Required
Acres of forestland and woodland treated annually	BLM-Administered Surface	NA/NA	50/50	150/100	75/75

BLM Bureau of Land Management
NA not applicable
NSO no surface occupancy
SSS Special Status Species

Alternative A manages wildland fire following AMR for areas where fire is not desired or can be used as a management tool. In addition, prescribed fire could be implemented to reduce hazardous fuels and meet fire and fuels management objectives. Nelle et al. (2000) concluded that burning did not benefit greater sage-grouse nesting or brood-rearing habitats and adversely impacted nesting habitats due to the extensive time it takes for sagebrush canopy to recover. Because greater sage-grouse hens show fidelity for nesting areas, catastrophic wildland fires that remove large tracts of sagebrush could be detrimental to greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) recommend limiting prescribed fire that may adversely impact dense sagebrush stands with adequate herbaceous vegetation. Fire and fuels management under Alternative A promotes a natural fire regime and may limit the potential for catastrophic fire, benefiting the greater sage-grouse.

Infestations of INNS are spread sporadically throughout the planning area. Plant INNS (weeds) contribute to the loss of rangeland productivity, increased soil erosion, reduced water quantity and quality, reduced species diversity, and loss of wildlife habitats. The BLM uses an integrated weed management program that involves grazing, fire management, and chemical, mechanical, and biological controls (BLM 1990a; BLM 1992d), as well as treats an average of 1,000 acres (see Appendix M) of various weed species each year. Despite these efforts, the spread of INNS is anticipated to degrade sagebrush habitats in the long term. Although the extent of sagebrush habitat degradation from the spread of INNS and other weeds is unknown for the planning area, the potential for these species to substantially impact greater sage-grouse habitats in the future exists (Wyoming Sage-Grouse Working Group 2003). Therefore, the anticipated continued expansion and spread of INNS under Alternative A is expected to adversely impact greater sage-grouse and sagebrush habitats.

By altering habitat components necessary for greater sage-grouse habitats, livestock grazing can impact the suitability and extent of greater sage-grouse habitats in the planning area (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) suggest that annual livestock grazing in greater sage-grouse nesting habitats may adversely impact the next year's nesting success. Under Alternative A, the BLM manages to improve range conditions on Category I allotments and maintain M and C category allotments. Adams et al. (2004) identify grazing intensity and timing and duration of grazing as the most important factors in maintaining herbaceous cover for greater sage-grouse. The current focus of management and monitoring does not emphasize the protective cover of vegetation and litter required by greater sage-grouse. Therefore, management of livestock grazing under Alternative A is not anticipated to improve the quality or quantity of habitat for the greater sage-grouse.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative A avoids surface disturbance or occupancy within ¼ mile of occupied leks and avoidance of surface-disturbing and disruptive activities in suitable nesting and early brood-rearing habitats within 2 miles of occupied leks. Table 4-11 identifies the acreage protected by these buffers. Braun (2002) indicates that adverse impacts to greater sage-grouse can occur within ¼- or ½-mile buffers and accordingly recommends no surface disturbance within 3 miles of occupied leks. No surface disturbance restrictions exist for greater sage-grouse winter habitats under Alternative A. No requirements to reduce noise levels of equipment exist under Alternative A. No restrictions on high profile structures in sagebrush obligate habitats exist under Alternative A, possibly fragmenting habitat because greater sage-grouse avoid some high-profile structures. Alternative A does not require implementing measures to prevent perching on overhead powerlines, potentially increasing predation from raptors and corvids on greater sage-grouse because of the increase in hunting opportunities. Current special designations within the planning area include the Raymond Mountain ACEC. No special designations emphasizing the greater sage-grouse currently exist under Alternative A.

Alternative A restrictions on surface disturbance or occupancy and disruptive activities around occupied greater sage-grouse leks are anticipated to provide some benefit to greater sage-grouse during sensitive periods; however, these restrictions may be insufficient to maintain or improve greater sage-grouse populations over the long term. In the long term, projected surface-disturbing and disruptive activities;

management of fire, INNS, and livestock grazing; and existing proactive management actions under Alternative A may adversely impact the greater sage-grouse in the planning area.

Nongame (Raptors)

Nongame raptors are anticipated to be impacted by surface-disturbing activities resulting from mineral development, fire and fuels management, INNS, livestock grazing, and management actions for biological resources under Alternative A. The late winter, spring, and early summer periods, when courtship, nest construction, incubation, and early brooding periods occur, are considered more sensitive to disturbance because adult nongame raptors are more prone to abandon nests at these times (USFWS 2002). Constructing roads, powerlines, and other development facilities can contribute to loss and fragmentation of raptor habitats and ultimately impact diversity and abundance of raptor populations (USFWS 2002).

Surface disturbance will have localized adverse impacts on raptor prey species by temporarily and permanently disturbing habitats for small mammals and birds. Under Alternative A, surface disturbance impacts to raptors are minimized by designated buffer zones around raptor nests. Development infrastructure also impacts raptors. For example utility poles can provide perching and nesting structures for raptors, but also can result in mortality to raptors through collision and electrocution (APLIC and USFWS 2005). Under Alternative A, no activity or surface disturbance is allowed for up to a ¾-mile radius from any active raptor nest from February 1 through July 31 (February 1 through August 15 for peregrine falcons). In addition, within the Moxa Arch area, these restrictions apply for within 1 mile of ferruginous hawk nests. The distances and dates for no disturbance can vary under Alternative A based on topography, species, season of use, and other pertinent factors. The BLM protects approximately 116,057 acres surrounding raptor nests under Alternative A.

Wind-energy facilities can be a source of mortality for raptors if raptors collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Raptors, other birds, and bats sometimes collide with tall wind energy and utility infrastructures, including guy wires used for stabilization. Wind-energy facilities also could be a source of habitat loss and fragmentation, as well as human disturbance from construction and maintenance activities. Alternative A makes no decisions regarding wind-energy development. Alternative A does not contain specific restrictions for preventing habitat fragmentation in the planning area.

Special status raptors are impacted by wildlife-disturbing activities that contribute to habitat loss, fragmentation, and degradation. Such actions include, but are not limited to, INNS control, OHV use, and livestock grazing. For example, the anticipated continued spread of INNS in the planning area is expected to degrade habitat for raptors and their prey over the long term. Fire is a useful tool for managing certain desirable wildlife habitats; however, fire management under Alternative A is not specifically targeted to benefit raptors. Although improper livestock grazing can adversely impact habitat of raptors and their prey, Alternative A is anticipated to continue to improve rangeland productivity and, therefore, not adversely impact raptors. Because special status raptors use a variety of habitats, general habitat impacts to raptors are similar to those discussed elsewhere in this section and in the Vegetation and Fish and Wildlife Resources – Wildlife sections in this chapter. In the long term, the continued spread of INNS in the planning area, combined with the loss and fragmentation of raptor habitats by wind energy, mineral development, and associated infrastructure, are expected to degrade habitat important to raptors and their prey and, thus, may adversely impact these species over the life of the plan.

Nongame (Neotropical Migrants)

Many neotropical migrants breed and nest on BLM-administered lands and winter in the tropics (BLM 1992c). Although impacts to these species on their winter habitat are not subject to BLM management, impacts to breeding and nesting habitats from surface-disturbing activities, INNS control, fire and fuels management, and management actions for biological resources on BLM-administered lands are anticipated for neotropical migrants. Surface disturbance is anticipated to have localized adverse impacts

to breeding and nesting habitats for neotropical migrants. Habitat impacts from surface disturbance may include temporary and permanent loss of breeding and nesting habitats due primarily to mineral development. Fragmentation and degradation of habitats for neotropical migrants also are anticipated from surface-disturbing activities and associated development. For example, neotropical migrants are expected to be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Because of the diverse species within the neotropical migrant category, additional impact analysis organizes these species into the following habitat guilds:

- Sagebrush and Shrubland Species – loggerhead shrike, sage thrasher, Brewer's sparrow, and sage sparrow
- Grassland Species – long-billed curlew and mountain plover
- Riparian and Wetland Species – yellow-billed cuckoo, trumpeter swan, white-faced ibis

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, Brewer's sparrow, sage sparrow, and sage thrasher depend on sagebrush habitats. These species may use other shrubland types, particularly during the nonbreeding season. The loggerhead shrike uses more of a diversity of shrubland types, including sagebrush. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) benefit all sagebrush and shrubland species. Adverse impacts to sagebrush habitats, as discussed for the greater sage-grouse, adversely impact these species. On the other hand, sagebrush and shrubland species may benefit from management actions in these communities including using prescribed fire to improve plant community health. In the long term, actions and allowable uses implemented under Alternative A are expected to benefit sagebrush and shrubland neotropical migrants within buffer areas established for the greater sage-grouse.

Grassland Species – Grasslands make up less than 1 percent of the planning area. Under Alternative A, there are no specific management actions for special status neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, INNS control, fire and fuels management, and livestock and wildlife grazing. Under Alternative A, short- and long-term surface disturbance to grassland habitats on BLM-administered land in the planning area is expected.

The mountain plover often is found in association with prairie dog towns because they tend to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. These species also are impacted by management actions for white-tailed prairie dogs (see Nongame [Mammals]). In addition, mountain plover show a nesting preference to areas heavily grazed by livestock (BLM 2005l). Range management practices that favor uniform grass cover of taller grasses and a lack of bare patches reduce available mountain plover habitats (BLM 2005l).

Riparian and Wetland Species – Although there are no specific management actions for special status neotropical migrants that use riparian areas and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas also provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitat for bald eagles. Actions that result in the degradation or destruction of cottonwood-willow riparian habitats adversely impact the yellow-billed cuckoo (BLM 2003c). Under Alternative A, riparian areas are managed to preserve, protect, and restore natural functions. See the Vegetation – Riparian and Wetland Communities section in this chapter for a more detailed description of impacts to riparian and wetland communities.

While most surface-disturbing activities will not occur in riparian and wetland areas, these areas may be indirectly impacted due to erosion and an increase of sediment going into streams. Under Alternative A, short-term and long-term disturbance acreage from BLM actions are the highest of all alternatives (see

Appendix M). Under Alternative A, surface-disturbing activities are avoided within 500 feet of riparian and wetland communities. Under Alternative A, the impacts to riparian and wetland communities associated with surface-disturbing activities are mostly indirect impacts and expected to be primarily adverse.

With proper grazing management and implementing rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve management of livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long-term are expected to continue to improve. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on Category I and maintaining M and C category (see Glossary) grazing allotments. Grazing is used as a management tool in the Mike Mathias Wetlands at Wheat Creek Meadows to enhance wildlife values of the area. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed within 200 feet of surface water sources. Application of chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact riparian and wetland communities. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation and wetland resources. Under Alternative A, management of water resources is performed according to existing regulations and with consideration for site-specific conditions. Management actions that strive to improve streams and conserve riparian and wetland areas generally result in long-term, beneficial impacts to special status neotropical migrants using these habitats.

Nongame (Mammals)

Impacts from surface-disturbing activities, INNS control, fire and fuels management, and management actions for biological resources are anticipated for special status nongame mammals. Surface disturbance is anticipated to have localized adverse impacts to special status nongame mammal habitats, including temporary and permanent loss of habitats. Fragmentation and degradation of habitats for special status nongame mammals also is anticipated from surface-disturbing activities and associated development.

It is important to note that some special status nongame mammal species, especially bats, may use more than one habitat type. However, because of the diverse species within the special status nongame mammal category, the impact analysis organizes these species into the following habitat guilds:

- Sagebrush and Shrubland Species – white-tailed prairie dog, black-footed ferret, pygmy rabbit, and Idaho pocket gopher
- Cave Species – long-eared myotis

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, special status nongame mammals in this category depend on sagebrush habitats or other shrubland types. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) are anticipated to benefit all sagebrush and shrubland species. Likewise, adverse impacts to sagebrush habitats, as discussed for the greater sage-grouse, also would adversely impact these species. In the long-term, actions implemented under Alternative A are expected to benefit special status nongame mammals occupying sagebrush habitats within designated greater sage-grouse lek habitat buffers. Black-footed ferrets are associated with and depend on prairie dog colonies in the planning area. Reductions in prairie dog populations may affect the black-footed ferret; however, measurable adverse impacts to prairie dog populations are not anticipated by BLM actions under Alternative A.

Cave Species – Bats that use caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM restricts oil and gas activities on slopes greater than 25 percent and implements an NSO restriction for fluid minerals on slopes greater than 40 percent under Alternative A.

Therefore, most cave habitats are expected to be protected under Alternative A; however, special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

The four amphibian species listed as sensitive in the planning area have historic observations, but no recent observations have been documented (Cerovski et al. 2004). Three of these species (northern leopard frog, boreal toad, and spotted frog) occur in riparian and wetland areas and could be impacted by activities in these communities. Beneficial impacts to these species are similar to the impacts described under Nongame (neotropical migrants) for this alternative. The Great Basin spadefoot may be impacted by activities in sagebrush communities, where this species occurs. Beneficial impacts to the spotted frog are similar to those described for greater sage-grouse for this alternative. Due to no recent observations of these four species in the planning area, impacts are anticipated to be minimal.

Alternative B

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative B that may minimize impacts to grizzly bear habitats include seasonal closures of big game winter ranges, seasonal no surface disturbance restrictions around raptor nests, and limitations of surface disturbances around greater sage-grouse leks. These restrictions are more stringent than those implemented under Alternative A, potentially benefiting grizzly bear habitats more than Alternative A. Restrictions on habitat fragmentation under Alternative B could have the greatest beneficial impact to potential grizzly bear habitats than all other alternatives.

Furbearing Animals

Under Alternative B, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Under Alternative B, short-term impacts from forest treatments may temporarily adversely impact Canada lynx; however, over the long-term these treatments are anticipated to improve Canada lynx habitats and the habitats of its prey species. Alternative B retains old growth forest areas and, when possible, retains connectivity of existing or potential old growth areas, benefiting Canada lynx more than Alternative A. Buffer areas around raptor nests (a seasonal restriction) are larger under Alternative B than Alternative A, potentially resulting in greater beneficial impacts to Canada lynx where these habitats overlap. Greater restrictions on livestock grazing under Alternative B reduce the potential for adverse impacts to riparian and wetland areas more than Alternative A. Alternative B implements a ¼-mile buffer around riparian and wetland areas, excluding surface-disturbing activities. Overall, Alternative B is anticipated to result in greater beneficial impacts to Canada lynx habitats than Alternative A due to greater restrictions on surface-disturbing activities and a greater potential to improve habitats.

Predatory Animals

Under Alternative B, there are no specific management actions for gray wolves; however, management actions that protect the habitats gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves.

Under Alternative B, seasonal no surface disturbance buffers around active raptor nests are larger than Alternative A, potentially having a greater beneficial impact to gray wolves than Alternative A. In

addition to the areas of NSO for fluid minerals in Alternative A, Alternative B implements NSO restrictions for fluid minerals for known locations of special status plant species, including all locations of *Physaria dornii*, the Alfred Corum and Nancy Hill emigrant gravesites, and the Emigrant Springs/Dempsey area. Development of roads under Alternative B is primarily for oil and gas development. Surface disturbance from roads totals 2,112 acres in the short-term, slightly less than Alternative A. Alternative B avoids habitat fragmentation to no more than 3 percent of available habitat for special status species and protects large, contiguous blocks of sagebrush, aspen, and mountain shrub communities. Alternative B identifies and preserves migration and travel corridors for big game and special status species. Alternative B seasonally closes all crucial big game winter range to motorized vehicle use. Based on less surface disturbance from roads and additional protections Alternative B implements for vegetation and big game, Alternative B is anticipated to result in greater beneficial impacts to gray wolves than Alternative A.

Game Birds (Greater Sage-Grouse)

Under Alternative B, estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in less loss, degradation, and fragmentation of sagebrush habitats than under Alternative A. In addition, Alternative B includes specific management actions for protection from habitat fragmentation (including sagebrush habitats) on BLM-administered lands. Wind-energy development is precluded in areas of greater sage-grouse leks and potential nesting habitats under Alternative B.

Interim and (or) final reclamation of surface disturbance under Alternative B is required within 1 year of completing drilling activities; follow-up seeding and nutrient testing is required if a healthy native plant community is not established within 3 years of initial seeding to determine if additional reclamation is needed. Development of appropriate reclamation standards is done at the project level incorporating up to date reclamation guidance and directives. Alternative B offers more stringent requirements than Alternative A for the successful establishment of preexisting native habitats. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative B help maintain long-term habitat quality in all habitat types, including sagebrush. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are less under Alternative B than under other alternatives, the associated adverse impacts to greater sage-grouse habitats also are expected to be less.

Alternative B restores a natural fire regime in the planning area and uses treatments to achieve measurable landscape-level objectives. In addition, Alternative B does not allow soil disturbance during suppression activities without consent of the authorized officer, thereby minimizing impacts to habitat quality. Use of a natural fire regime in fire-adapted ecosystems and reduction in fuel loads in the planning area may reduce the potential for catastrophic fire. Alternative B is anticipated to benefit the greater sage-grouse more than Alternative A.

Alternative B provides greater protection and minimizes impacts to soils, which minimizes the potential adverse impacts associated with the establishment and spread of INNS compared with Alternative A. In addition to the requirement for certified weed-free seed and mulch in the restoration project, Alternative B requires the use of certified weed-free forage and feeds to prevent the establishment of new weed areas. These actions are anticipated to prevent the establishment and spread of INNS more under Alternative B than Alternative A, resulting in greater beneficial impacts to greater sage-grouse habitats under Alternative B.

Under Alternative B, the BLM implements greater restrictions and identifies more areas not available for livestock grazing. Improvements to range conditions focus on watershed, riparian, and wildlife values, but range-improvement projects do not occur within ½ mile of special status species unless the project will benefit the special status species. These restrictions under Alternative B are anticipated to benefit greater sage-grouse by increasing the quantity and quality of herbaceous plant species more than Alternative A.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative B prohibits rather than avoids surface disturbance or occupancy to protect associated nesting and early brood-rearing habitats compared to Alternative A. Alternative B protects greater sage-grouse winter habitats unlike Alternative A and implements noise level restrictions on equipment for species relying on aural cues for breeding. In addition, Alternative B manages sagebrush communities to enhance or maintain these communities, which will benefit greater sage-grouse more than Alternative A by reducing habitat fragmentation. Designation of white-tailed prairie dog colonies as ACECs under Alternative B increase protection of sagebrush habitats and beneficial impacts to greater sage-grouse. Alternative B also requires burying new low voltage utility lines and installing anti-perch devices on new high voltage utility lines, resulting in relatively little increase in predation on greater sage-grouse from raptors and corvids.

In the long term, the prohibition of surface disturbance or occupancy around greater sage-grouse leks, combined with the proactive management action establishing the white-tailed prairie dog ACECs and enhancing large, contiguous blocks of sagebrush habitat, are anticipated to protect sagebrush habitats. Under Alternative B, these restrictions and proactive management actions benefit greater sage-grouse to a greater extent than under Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to adversely impact raptors less under Alternative B than under Alternative A. Compared to Alternative A, restrictions around raptor nests are more extensive in areas under Alternative B; therefore, resulting in fewer direct impacts to nesting raptors. Buffers around all raptor nests would be 1½-miles wide. However, under Alternative B, the timing of these restrictions is specific to the species. For example, the restrictions apply for golden eagle nests from February 1 through July 15 while restrictions around northern goshawk nests are in place from April 1 through August 31. Alternative B protects more BLM-administered surface surrounding raptor nests compared to Alternative A, resulting in greater beneficial impacts to special status raptors.

Alternative B is anticipated to continue improving rangeland productivity and slowing the spread of INNS more than Alternative A. Alternative B identifies the least acreage suitable for wind-energy development (176,109 acres), thereby having the least potential to fragment sagebrush habitats. Wind-energy development projects are prohibited in locations of active raptor nests and migration corridors under Alternative B, benefiting raptors in the planning area. These actions are anticipated to protect and enhance more raptor habitats compared to Alternative A. Overall, the restrictions to surface-disturbing activities, fire suppression, livestock grazing, and INNS control under Alternative B are anticipated to protect more raptor habitats compared to Alternative A.

Nongame (Neotropical Migrants)

Under Alternative B, short- and long-term surface disturbance are anticipated to be less; therefore, associated adverse impacts to breeding and nesting habitats for neotropical migrants are anticipated to be less compared to Alternative A. Impacts to neotropical migrants from wind-energy development under Alternative B also are anticipated to be less than Alternative A.

Sagebrush and Shrubland Species – Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland species.

Grassland Species – Although no specific management actions are identified under Alternative B for special status neotropical migrants utilizing grasslands, these species benefit by management actions treating woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative B, less grassland habitat is expected to be impacted by BLM actions compared to Alternative

A. Moreover, management actions under Alternative B are anticipated to protect more grassland and other vegetation types from habitat fragmentation compared to Alternative A. The mountain plover and long-billed curlew nest in areas with sparse vegetation are anticipated to be impacted by management actions for white-tailed prairie dogs (see Nongame [Mammals]). Greater restrictions on livestock grazing under Alternative B may adversely impact mountain plover by reducing available mountain plover habitats (i.e., heavily grazed areas and areas with bare patches).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian and wetland areas are identified under Alternative B, these species are expected to be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitats for bald eagles.

Under Alternative B, managing livestock grazing and wetland and riparian areas could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Alternative B identifies the Mike Mathias Wetlands at Wheat Creek Meadows as not available for livestock grazing, potentially benefiting special status neotropical migrants utilizing these areas. Furthermore, Alternative B excludes surface-disturbing activities within ¼ mile of riparian and wetland areas. These actions would ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants. Overall, restrictions on wind-energy development, less surface disturbance, and managing INNS control and livestock grazing under Alternative B are anticipated to protect and enhance more habitat and, thus, benefit special status neotropical migrants within the planning area more than Alternative A.

Nongame (Mammals)

Impacts from surface-disturbing activities, INNS control, fire and fuels management, livestock grazing, and management actions for biological resources under Alternative B are anticipated to be less for special status nongame mammals compared to Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Less surface disturbance and less habitat fragmentation under Alternative B are anticipated to benefit special status nongame mammal species more than under Alternative A. In addition, prohibition of surface disturbance in and the ACEC designation of all white-tailed prairie dog colonies 100 acres or greater under Alternative B is anticipated to benefit species associated with these areas more than all other alternatives.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM prohibits surface-disturbing activities on slopes greater of 10 percent or greater under Alternative B and implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Therefore, more cave habitats are expected to be protected under Alternative B than under Alternative A; however, special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative B are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats

and less than under Alternative A. Potential adverse impacts to the great basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and less than Alternative A.

Alternative C

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative C that may minimize impacts to grizzly bear habitats are similar to Alternative A; however, avoidance of habitat fragmentation under Alternative C could benefit grizzly bear more than Alternative A.

Furbearing Animals

Under Alternative C, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Alternative C allows the greatest annual sale quantity of 1,100 CCF, potentially adversely impacting Canada lynx more than the other alternatives; however, Alternative C retains old growth forest areas, similar to Alternative B, resulting in greater beneficial impacts than Alternative A. Buffers around raptor nests under Alternative C are smaller and encompass shorter timeframes compared to Alternative A, resulting in less potential beneficial impacts to Canada lynx. Management of livestock grazing under Alternative C is similar to Alternative A and has fewer restrictions than Alternative B. Buffers for exclusion of surface-disturbing activities in riparian and wetland areas under Alternative C are similar to Alternative A. Overall, Alternative C is anticipated to result in similar beneficial impacts to Canada lynx habitats as Alternative A.

Predatory Animals

Under Alternative C, there are no specific management actions for gray wolves; however, management actions that protect the habitats gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves.

Under Alternative C, seasonal no surface disturbance buffers around active raptor nests are smaller in size and shorter in timeframe compared to Alternative A. Alternative C implements the same NSO restrictions for fluid minerals as Alternative A, except the NSO restriction in *Physaria dornii* communities is removed under Alternative C. Development of roads under Alternative C is primarily for oil and gas development. Surface disturbance from roads in the short-term is the same as Alternative A. Alternative C avoids habitat fragmentation in habitat for special status species, resulting in greater beneficial impacts for gray wolves compared to Alternative A, but less than Alternative B. Alternative C does not specifically protect large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, similar to Alternative A. Similar to Alternative B, Alternative C identifies migration and travel corridors for big game and special status species, but instead of preserving these areas as in Alternative B, Alternative C develops management for these areas. This management action benefits gray wolves more than Alternative A. Alternative C does not implement any seasonal closures on crucial big game winter range with regards to motorized vehicle use. Based on less surface disturbance from roads, less potential habitat fragmentation, and greater management of travel corridors, Alternative C is anticipated to result in greater beneficial impacts to gray wolves than Alternative A, but less than Alternative B.

Game Birds (Greater Sage-Grouse)

Estimated short-term surface disturbance from BLM actions under Alternative C is less than Alternative A (Table 4-1); however, estimated long-term surface disturbance is similar to Alternative A. Disturbance to sagebrush habitats is anticipated to be more than Alternative A. Under Alternative C, the greatest acreage suitable for wind-energy development is identified and could result in the greatest adverse impacts to greater sage-grouse. Alternative C manages vegetation resources to comply with the ESA, similar to Alternative A, both reducing habitat fragmentation less than Alternative B. Greater sage-grouse lek and nesting and early brood-rearing habitat avoidance buffers apply, similar to Alternative A. Alternative C does not impose greater sage-grouse winter concentration area restrictions, similar to Alternative A.

Under Alternative C, protection and mitigation to address surface-disturbing activities are similar to Alternative A, except BMPs are applied to limit soil erosion and related undesirable conditions, with an emphasis in areas with sensitive soil characteristics. Oil- and gas-related activities are restricted on slopes greater than 25 percent, but there are no NSO restrictions for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance is similar to Alternative A. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are similar under Alternative C compared to Alternative A, the associated adverse impacts to greater sage-grouse also are expected to be similar.

Alternative C does not restore a natural fire regime to fire-adapted ecosystems in the planning area; all wildland fires are suppressed under Alternative C. Prescribed fire and wildland fire use are precluded under Alternative C to meet fire and fuels management objectives. These actions may increase hazardous fuels, thereby increasing the risk of catastrophic fire, adversely impacting greater sage-grouse more than under Alternative A.

Alternative C is similar to Alternative A with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals to combat INNS. Alternative C recommends the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas. Impacts to greater sage-grouse from INNS under Alternative C are similar to Alternative A.

Under Alternative C, the BLM manages the grazing system and range improvements to maximize livestock grazing, meeting standards and guidelines. Under Alternative C, impacts to greater sage-grouse from livestock grazing are similar to Alternative A.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative C avoids surface disturbance to protect associated nesting and early brood-rearing habitats, but does not protect winter concentration areas, similar to Alternative A. Alternative C does not implement noise-level restrictions on equipment for species relying on aural cues for breeding, similar to Alternative A. Alternative C manages vegetation resources to comply with the ESA, similar to Alternative A, but reduces habitat fragmentation less than Alternative B. No white-tailed prairie dog colonies are designated ACECs under Alternative C, similar to Alternative A. The allowance of high-profile structures is a detriment to sagebrush obligate species due to raptors using these perches to hunt prey. Impacts to greater sage-grouse from predation by raptors and corvids would be similar to Alternative A. In addition, high-profile structures may fragment greater sage-grouse habitats due to this species avoidance of these structures, adversely impacting greater sage-grouse similar to Alternative A and more than Alternative B.

Restrictions on surface disturbance or occupancy proposed by Alternative C are anticipated to benefit greater sage-grouse during their sensitive nesting periods and in sensitive habitats, such as leks. Based on management actions regarding surface disturbance, habitat fragmentation, reclamation, and resource uses within the planning area, Alternative C is anticipated to have beneficial impacts to greater sage-grouse that are similar to, but slightly greater than, Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors more under Alternative C than under Alternative A. Under Alternative C, restrictions around raptor nests would be less extensive, thereby benefiting nesting special status raptors less compared to Alternative A.

The potential short- and long-term surface disturbance from the development of wind-energy facilities on BLM-administered land under Alternative C is greater than any other alternative because Alternative C identifies the greatest acreage suitable for these activities. Alternative C specifically addresses habitat fragmentation, thereby having greater beneficial impacts to raptors than Alternative A.

Alternative C is anticipated to protect less raptor habitats through smaller buffers and shorter timeframes, thereby providing less benefit to special status raptors compared to Alternative A. Management actions for INNS control under Alternative C are anticipated to result in similar special status raptor habitat quality impacts as under Alternative A. Management actions for fire management under Alternative C could increase the potential for catastrophic fire, thereby resulting in greater adverse impacts to special status raptor habitats than Alternative A. Alternative C is anticipated to maximize livestock grazing while meeting standards and guidelines. Based on these actions, Alternative C is anticipated to result in greater adverse impacts to special status raptor habitats than Alternative A.

Nongame (Neotropical Migrants)

Under Alternative C, short-term surface disturbance is anticipated to be less than Alternative A, but long-term surfaced disturbance is anticipated to be similar to Alternative A over the life of the plan. Associated adverse impacts to breeding and nesting habitats for special status neotropical migrants are anticipated to be similar to Alternative A. Wind-energy development acreage is potentially greater than any other alternative; therefore, impacts to special status neotropical migrants from wind-energy development under Alternative C are anticipated to be greater than under any other alternative.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under this alternative for Game Birds (greater sage-grouse), will benefit all sagebrush and shrubland species.

Grassland Species – Although no specific management actions for special status neotropical migrants that utilize grasslands are identified under Alternative C, these species are expected to benefit by management actions that treat woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are expected to be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock grazing. Alternative C impacts less and protects more grassland habitats from fragmentation compared to Alternative A. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species also are impacted by management actions for white-tailed prairie dogs (discussed under Nongame [Mammals]) under Alternative C, which does not specifically address surface-disturbing activities in white-tailed prairie dog habitats.

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian areas and wetlands are identified under Alternative C, these species are expected to be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative C, riparian areas are managed similar to Alternative A. Long-term surface disturbance acreage under Alternative C is similar to Alternative A.

Under Alternative C, management of livestock grazing could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Alternative C identifies the Mike Mathias Wetlands at

Wheat Creek Meadows as available for livestock grazing, potentially adversely impacting special status neotropical migrants in this area. Due to the greater emphasis on livestock values under Alternative C, beneficial impacts to special status neotropical migrants are expected to be less than under Alternative A. Overall, Alternative C provides the least protection to riparian and wetland communities, thereby resulting in the least beneficial impact to special status neotropical migrants of all alternatives.

Nongame (Mammals)

Surface-disturbing activities, INNS control, fire and fuels management, livestock grazing, and management actions for biological resources are anticipated to impact special status nongame mammals. Long-term surface disturbance under Alternative C is similar to Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under this alternative for Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Surface disturbance in the short term under Alternative C is less than Alternative A, but in the long-term, is similar to Alternative A, resulting in impacts similar to Alternative A for sagebrush and shrubland species. Alternative C does not designate white-tailed prairie dog colonies of 100 acres or greater as ACECs.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Under Alternative C, the BLM restricts oil and gas activities on slopes greater than 25 percent, potentially protecting some cave habitats. Because acreage suitable for wind-energy development is greater under Alternative C compared to Alternative A, impacts to special status bats from wind-energy development under Alternative C are anticipated to be greater than Alternative A.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative C are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and more than under Alternative A. Potential adverse impacts to the Great Basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and similar to Alternative A.

Alternative D (Preferred Alternative)

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative D may minimize impacts to grizzly bear habitats more than Alternative A. In addition, avoidance of habitat fragmentation under Alternative D may benefit grizzly bear more than Alternative A.

Furbearing Animals

Under Alternative D, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Restrictions to surface disturbance around active raptor nests are less under Alternative D than under Alternative A. Under Alternative B, short-term

impacts from forest treatments may temporarily adversely impact Canada lynx; however, over the long term, these treatments are anticipated to improve Canada lynx habitats and the habitats of its prey. Alternative D treats more acres annually than Alternative A and retains old growth forest areas similar to Alternative B.

Riparian areas are maintained, improved, or restored under Alternative D to enhance habitat forage conditions for livestock and wildlife and improve stream water quality. Restrictions to surface disturbance in riparian and wetland areas are similar to Alternative A. These management actions under Alternative D are anticipated to have greater beneficial impacts to Canada lynx than Alternative A.

Predatory Animals

Under Alternative D, there are no specific management actions for gray wolves; however, management actions that protect the habitat gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves.

Under Alternative D, seasonal no surface disturbance buffers around active raptor nests are similar in size, but encompass a shorter timeframe compared to Alternative A. Alternative D implements the same NSO restrictions for fluid minerals as Alternative A, but also implements an NSO restriction for fluid minerals on all known locations of special status plant species, except *Physaria dornii* populations. Development of roads under Alternative D is primarily for oil and gas development. Surface disturbance from roads is the same as Alternative A. Under Alternative D, management of habitat fragmentation is the same as Alternative C, resulting in greater beneficial impacts for gray wolves compared to Alternative A, but less than Alternative B. Alternative D protects large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, similar to Alternative B. Similar to alternatives B and C, Alternative D identifies migration and travel corridors for big game and special status species, but instead of preserving these areas as in Alternative B, Alternative D works cooperatively to develop management for these areas to reduce conflicts. This management action benefits gray wolves more than Alternative A. Alternative D implements a seasonal closure on crucial big game winter range in the Slate Creek, Rock Creek, Bridger Creek, and Raymond Mountain areas with regard to motorized vehicle use. Although exemptions apply, this management action is anticipated to benefit gray wolves more than Alternative A because it is implemented annually, rather than as needed. Based on less surface disturbance from roads, less potential habitat fragmentation, and greater management of travel corridors, Alternative D is anticipated to result in greater beneficial impacts to gray wolves than Alternative A, but less than Alternative B.

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions under Alternative D are less than Alternative A (Table 4-1) and the second lowest of all alternatives. Alternative D reduces habitat fragmentation by maintaining or enhancing sagebrush communities, similar to Alternative B. Greater sage-grouse lek and nesting and early brood-rearing habitat avoidance buffers apply, similar to Alternative A. Alternative D implements greater sage-grouse winter concentration area restrictions, similar to Alternative B, benefiting this species.

Reclamation requirements under Alternative D are similar to Alternative B and more stringent than under Alternative A for the successful establishment of preexisting native habitats. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative D help maintain long-term habitat quality in all habitat types, including sagebrush, similar to Alternative B.

Similar to Alternative A, Alternative D suppression for wildland fires follows AMR; however, under Alternative D, wildland fire in high-density urban areas generally are suppressed, while wildland fire in low-density urban areas can be used to achieve resource objectives. Alternative D restores a natural fire regime to fire-adapted ecosystems in the planning area and uses prescribed fire to achieve measurable

resource objectives. The anticipated reduction in fuel loads under Alternative D is anticipated to reduce the potential for catastrophic fire, benefiting greater sage-grouse nesting habitats.

Alternative D is similar to alternatives A and C with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. However, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, similar to Alternative B. The use of certified weed-free seed and mulch is anticipated to slow the spread of INNS in the planning area, thereby benefiting greater sage-grouse habitats more than Alternative A.

Alternative D manages livestock grazing similar to, but more restrictive than, Alternative A and is less restrictive than Alternative B. Greater restrictions than Alternative A are anticipated have greater beneficial impacts to greater sage-grouse under Alternative D.

Similar to Alternative B, Alternative D maintains or enhances sagebrush communities in large, contiguous blocks, lessening the potential for habitat fragmentation and, thus, improving habitat conditions for greater sage-grouse. While Alternative D does not put a cap on the percentage of special status species habitat fragmented (as in Alternative B), avoidance of fragmentation, similar to Alternative C, provides greater beneficial impacts to greater sage-grouse than Alternative A, which does not address habitat fragmentation. Alternative D protects lek, nesting, and early brood-rearing habitats similar to Alternative B, providing more beneficial impacts than Alternative A to greater sage-grouse by adding protections for winter habitats. No white-tailed prairie dog ACECs are designated under Alternative D, similar to alternatives A and C, resulting in less beneficial impacts to greater sage-grouse than Alternative B. Under Alternative D, restrictions on high-profile structures in sagebrush habitat result in less adverse impacts to greater sage-grouse than Alternative A, but more than Alternative B. Impacts to greater sage-grouse from predation by raptors and corvids would be similar to Alternative B. In addition, Alternative D provides greater beneficial impacts to greater sage-grouse with more restrictions on noise levels than Alternative A, but less than Alternative B.

Restrictions on surface disturbance or occupancy proposed by Alternative D are anticipated to benefit greater sage-grouse during their sensitive nesting and wintering periods and in sensitive habitats, such as leks. Alternative D provides greater protection to grassland and shrubland communities compared with alternatives A and C, but less protection than the maximum provided by Alternative B. Alternative D is anticipated to have greater beneficial impacts to greater sage-grouse than Alternative A, but less than Alternative B, due to increased protection from habitat fragmentation and more restrictive management actions regarding reclamation and resource uses within the planning area.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors to a similar extent as Alternative A. Restrictions around raptor nests are less extensive under Alternative D due to shorter timeframes, therefore benefiting nesting special status raptors less than under Alternative A.

Alternative D identifies the second highest acreage suitable for wind-energy development on BLM-administered land, thereby increasing the potential loss and degradation of special status raptor habitats compared to Alternative B. Alternative D benefits special status raptors more than Alternative A by managing to maintain and enhance large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, thereby reducing habitat fragmentation.

Under Alternative D, protection and mitigation to address surface-disturbing activities is similar to Alternative A. Reclamation of surface disturbance is similar to Alternative B. The potential establishment and spread of INNS under Alterative D are expected to be less than Alternative A, resulting in fewer adverse impacts to special status raptor habitats than Alternative A. Alternative D places greater restrictions on wildland fire management than Alternative A. However, Alternative D uses wildland fire

to meet management objectives potentially reducing hazardous fuel loads, resulting in greater beneficial impacts to special status raptor habitats than Alternative A. Livestock grazing under Alternative D has more beneficial impacts to special status raptor habitats than Alternative A, but less than Alternative B due to greater restrictions placed on the resource use.

Alternative D is anticipated to protect less raptor habitat through buffers, thereby providing lesser benefit to special status raptors compared to Alternative A; however, management actions for INNS control and fire and fuels management under Alternative D are anticipated to result in greater beneficial impacts to special status raptor habitat quality than Alternative A.

Nongame (Neotropical Migrants)

Under Alternative D, short- and long-term surface disturbance are anticipated to be less than Alternative A; therefore, associated adverse impacts to breeding and nesting habitats for neotropical migrants are anticipated to be less than Alternative A. The acreage suitable for wind-energy development under Alternative D is approximately half that of Alternative C. Alternative D manages large, contiguous blocks of habitat for protection from habitat fragmentation, similar to Alternative B. Potential impacts to special status neotropical migrants from habitat fragmentation under Alternative D are, therefore, anticipated to be similar to Alternative B.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit all sagebrush and shrubland species.

Grassland Species – Under Alternative D, no specific management actions for special status neotropical migrants that utilize grasslands exist. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative D, short- and long-term surface disturbance in grassland habitats is less than Alternative A. Similar to Alternative C, Alternative D avoids habitat fragmentation, protecting special status species' habitats more than Alternative A, which does not address habitat fragmentation. Alternative D could adversely impact grassland habitats and special status grassland species more than Alternative B. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species could also be impacted by management actions for white-tailed prairie dogs (described under Nongame [Mammals]).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants using riparian and wetland habitats are identified under Alternative D, these species are expected to benefit from other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Surface-disturbing activities are prohibited within 500 feet of riparian and wetland areas, similar to Alternative A. In general, the lower acreage of surface disturbance under Alternative D is anticipated to have a greater indirect beneficial impact to special status neotropical migrants than Alternative A, but less than Alternative B.

Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Alternative D protects and enhances riparian and wetland areas by managing livestock and grazing wildlife in these areas. Management actions could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Impacts from livestock grazing to special status neotropical migrants are anticipated to be similar to Alternative A. Alternative D reduces the potential spread of INNS through requiring certified weed-free seed, mulch, forage, and feeds, benefiting special status neotropical migrants in riparian and wetland areas. Overall, Alternative D provides greater protection to riparian and wetland communities, benefiting special status neotropical migrants more than alternatives A and C, but less than Alternative B.

Nongame (Mammals)

Impacts from INNS control, fire and fuels management, livestock grazing, and management actions for biological resources are anticipated to be similar under Alternative D for special status nongame mammals as under Alternative A. However, impacts from surface-disturbing activities are anticipated to be less under Alternative D compared to Alternative A. Short- and long-term surface disturbance acreage is approximately half that of Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to greater sage-grouse habitats, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Alternative D avoids habitat fragmentation similar to Alternative C, thereby providing greater benefit to special status nongame mammals compared to Alternative A. Alternative D results in less surface disturbance than alternatives A and C, but more than Alternative B. Although white-tailed prairie dog colonies of 100 acres or larger are not designated ACECs under Alternative D, this alternative does avoid disruptive activities that could result in the collapse of burrows in occupied white-tailed prairie dog colonies or complexes of 200 acres or greater, benefiting species associated with prairie dog colonies more than Alternative A.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Alternative D implements similar restrictions as Alternative A to oil and gas activities, but also implements specific restrictions for sensitive soils and offers additional erosion protection to the Green River and Bear River sub-basins and additional protection to soils across the planning area. The acreage identified as suitable for wind-energy development is greater under Alternative D than Alternative B, but less than Alternative C. This alternative is expected to result in less adverse impacts to cave species than Alternative A due to the additional protections on steep slopes and less surface disturbance.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative D are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and less than under Alternative A, but more than Alternative B. Potential adverse impacts to the Great Basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and less than Alternative A.

4.4.8.3 Conclusion

Based on the projected disturbance and proposed actions summarized in Appendix M, Table 4-1, and the impacts described in this section, the following conclusions are made.

Alternatives B and D potentially disturb the least area both short- and long-term compared to alternatives A and C. The less short- and long-term surface disturbance to BLM-administered land and to vegetation types, the greater the beneficial impact to special status species in the planning area.

Alternatives B, C, and D provide management to reduce habitat fragmentation. Alternative B proposes to protect the most habitat followed by alternatives D and C. Alternative A does not propose to protect habitat from habitat fragmentation.

Alternative B is anticipated to provide the greatest protection for greater sage-grouse leks, nesting and early brood-rearing habitats, and winter habitats. Buffers around leks are similar for alternatives A, C, and D; however, Alternative D provides additional protection to winter habitats, similar to Alternative B.

Other sagebrush-dependent species (e.g., Brewer's sparrow, sage sparrow, and sage thrasher) are anticipated to benefit from these protective management actions for the greater sage-grouse.

Alternative B protects the largest area around raptor nests. Alternatives A, C, and D protect similar, but less area, than Alternative B. Alternative A provides more protection than alternatives C and D due to a blanket seasonal restriction rather than seasonal dates based on species.

For other special status species, there are no specific management actions that directly address their protection or conservation. Therefore, adverse or beneficial impacts to special status species' habitats provided a more meaningful comparison of impacts among alternatives. Alternative B potentially provides the greatest beneficial impacts to special status wildlife habitats by imposing the most restrictions to minimize habitat loss, fragmentation, and degradation, and by including the most proactive actions to restore and enhance habitats. Alternatives A and C are anticipated to have the greatest adverse impacts to wildlife habitats and, therefore, the fewest beneficial impacts for special status wildlife. Alternative D generally provides an intermediate level of benefits. In the long term, the overall potential impact of alternatives to special status wildlife species in order of ascending adverse and descending beneficial impacts are B, D, C, and A.

4.4.9 Invasive Nonnative Species

Actions that could occur through implementing each alternative could be impacted by the spread of INNS. This section describes the impacts of each alternative on INNS in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse.

The presence of INNS in the planning area is considered an adverse impact to most other resources. Actions that contribute to the introduction of INNS, the spread of existing INNS populations, or that avoid, reduce, or prohibit INNS control activities in the planning area also are considered adverse impacts.

Direct INNS impacts typically result from actions that disturb the soil or that otherwise create habitats (i.e., seedbed) for the establishment of INNS. Indirect impacts result from activities that avoid, reduce, or prohibit INNS control activities in the planning area. The transport (by wildlife, livestock, vehicles, wind, or water) of INNS seed, plant parts, propagates, pathogens, or other INNS to new locations, thereby expanding the distribution or increasing the rate of spread of INNS, is also considered an indirect impact.

4.4.9.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- INNS occur in greatest density in areas of past or current surface disturbance. Areas disturbed in the past and reclaimed may contain populations of INNS, but the abundance and distribution of these populations do not vary by alternative.
- Though there are exceptions, most INNS are less likely to invade relatively undisturbed and healthy natural vegetative communities.
- Roadways, trails, ROW, and corridors are major routes that can spread INNS through transport on motor vehicles and OHVs. INNS also can spread through watercourses, wind, and by wildlife and livestock movement.
- The amount of new surface disturbance associated with an alternative is a good index of potential impact by INNS. The larger the acreage of surface disturbance, the greater the adverse impact by INNS.
- Success of reclamation measures prescribed as a condition of development is unknown and could underestimate the potential impact from INNS, but is not expected to vary by alternative.

- Enforcement of restrictions related to recreation and OHV and dispersed travel can be assumed only if adequate funding and personnel are available to do the job.
- IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch to prevent the establishment of new INNS in restoration projects on public lands.
- Partners Against Weeds – An Action Plan for the BLM, January 1996, establishes a strategy to prevent weeds through cooperation with all partners. It outlines goals and specific actions to help prevent and control the spread of weeds. This action plan, along with any future updates and guidance, would be followed to control and prevent weed problems.
- Seeds from some INNS can remain dormant and viable in the soil for periods that exceed the 5-year division between short- and long-term impacts. Therefore, favorable site conditions may serve to reintroduce INNS to reclaimed sites without additional surface disturbance.
- The area evaluated for potential impacts includes the planning area and Uinta and Lincoln counties' weed-control districts.
- The acreage of long-term disturbance (Appendix M) includes facilities that cannot be reclaimed and that, in most cases, will not provide long-term habitats for INNS. For example, well pads, communication sites, powerlines, roads, wind-energy facilities, and other infrastructure will replace existing native vegetation with pervious or impervious surfaces for a period exceeding 5 years.
- Controlling and (or) eradicating INNS includes chemical, mechanical, biological, and cultural techniques.

4.4.9.2 Analysis of Alternatives

Allowable uses and management actions that could affect the spread and introduction of INNS include all surface-disturbing activities; concentrated livestock and native ungulate grazing; fire and fuels management; recreation, OHV use, and dispersed travel; and proactive management actions.

As INNS are affected by the alternatives, INNS can, in turn, impact other resources. Impacts of INNS on other resources are described in the Fire and Fuels Management section and in other biological resources sections. Spread of INNS also can fragment landscapes, thus creating more habitat parcels in which INNS can establish. Fragmented landscapes contain fewer intact ecosystems (Noss 1987).

Impacts Common to All Alternatives

The types of impacts projected to occur as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts resulting from surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, recreation, OHV use, dispersed travel, and proactive management actions are described under individual alternatives.

Though the application of INNS control described in the following alternatives focuses on control of plant pests, it is expected that impacts associated with the spread of nonnative animals, tree pathogens (such as western balsam bark beetle and various root diseases), diseases that affect humans as well as animals (such as the West Nile virus, bird flu, etc.), and other nonplant INNS also would be related to exposure and transport resulting from surface-disturbing activities, fire and fuels management, OHV use, recreation, and dispersed travel. Specific management actions for nonplant INNS are not identified in the following alternatives, but may have to be addressed in the foreseeable future. The Animal and Plant Health Inspection Service (APHIS) currently is the BLM's agent for controlling animal pests.

Because the acreage open to livestock grazing under all alternatives is similar and because all alternatives are managed according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing*

Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998a), the types of adverse and beneficial impacts from livestock and native ungulate grazing are expected to be similar among alternatives, and are anticipated to vary by alternative as a result of specific management actions. Short- and long-term beneficial impacts are anticipated from improvements to vegetative cover and plant vigor and control of INNS infestations that can occur under proper livestock grazing. Short- and long-term adverse impacts associated with livestock and native ungulate grazing are anticipated to occur primarily in animal concentration areas (e.g., water sources, trails, favored forage) and include transport of INNS seeds and propagates and disturbance of soil, creating habitats for the spread of INNS. Moreover, without a holding period to allow flushing, movement of livestock onto or within public lands can transport INNS seeds to new locations, thereby expanding INNS invasions. Kay (1995) indicates that high densities of native ungulates can reduce or eliminate shrub-seed production and impair recruitment of young shrubs. In addition, Hall and Bryant (1995) indicate that as vegetation stubble height is reduced, a shift in cattle preference and damage to vegetation can occur. The impacts described by Kay (1995) and Hall and Bryant (1995) are expected to adversely impact INNS; however, the impacts described by these studies are expected to remain uncommon and occur in isolated instances within the planning area under all alternatives due to grazing management. For more details, see the Livestock Grazing Management and Vegetation sections.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities, from all actions listed in Appendix M, provide opportunities for the establishment and spread of INNS. BLM actions under Alternative A are anticipated to impact 214,120 acres and 144,673 acres in the short- and long-term, respectively, in the planning area over the life of the plan. No specific constraints on resource management to minimize habitat fragmentation are identified for Alternative A. Approximately 1,474,545 acres of federal mineral estate are currently administratively available to oil and gas leasing consideration under Alternative A.

Under Alternative A, surface-disturbing activities utilize existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance to reestablish healthy native plant communities based on preexisting composition (where possible) begins within 1 year of abandoning operations. If unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed.

Both short- and long-term impacts are anticipated from surface disturbance. Short-term impacts will occur during the 5 years following disturbance while soil is bare of vegetation and reclamation activities strive to stabilize the soil and revegetate the area. Long-term impacts will occur beyond the 5 years due to reclamation efforts that are not 100-percent effective in preventing INNS establishment. For example, the seeds and other parts of INNS plants that establish along roads are anticipated to be spread by cars and wind to other sites within the planning area throughout the life of the plan. In addition, some INNS seeds are able to lie dormant in the soil beyond the 5-year reclamation period. For the reasons stated, most adverse impacts are anticipated to be long term.

Fire and Fuels Management. Beneficial and adverse, direct and indirect, short- and long-term impacts from fire and fuels management are anticipated under all alternatives. By destroying or damaging INNS plants and seeds, beneficial impacts can be realized based on the timing and location of fire. Conversely, adverse impacts from suppression activities that disturb soil and from fires that remove native vegetation and expose soil result in conditions that provide a seedbed for INNS establishment. The adverse impacts from fire and fuels management may be considered direct or indirect because the impact(s) may or may

not occur immediately. Under Alternative A, wildland fire suppression will follow the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which will also protect areas from INNS. Fire suppression under Alternative A is anticipated to have adverse, short-, and long-term impacts within the planning area.

Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Under Alternative A, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem to meet fire and fuels resource management objectives. This action could result in a beneficial or adverse impact with regard to INNS, depending on whether the result is an improvement to habitat quality or an increase in INNS.

Livestock and Native Ungulate Grazing. The impacts of livestock and native ungulate grazing on INNS from all alternatives are anticipated to result in a mix of beneficial and adverse impacts. The entire planning area currently is open to livestock grazing with the exception of a few small parcels. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on Category I and maintaining M and C category grazing allotments (see Glossary). Improvement in the health of rangelands reduces the opportunities that INNS have to invade and colonize an area.

Recreation, OHV Use, and Dispersed Travel. Indirect, adverse, short-, and long-term impacts from transportation of materials, people, and vehicles into and out of the planning area occur at recreational sites, trailheads, trails, and transportation routes. INNS are established in some of these areas and their seeds are spread to other areas by vehicles and people. Due to the permanent nature of most recreational sites, trails, and transportation routes, most associated adverse impacts are anticipated to be long term. The resulting impact is the spread of INNS into new areas within the planning area. Restrictions to off-road, road, and other travel corridor use will be initiated, and a comprehensive inspection and decontamination procedure for animals, equipment, materials, and vehicles will need to be adopted to completely halt the spread of INNS onto and within BLM-administered lands. However, some management actions (i.e., the use of certified weed-free seed and mulch) are available under this alternative to lessen the threat of INNS from being introduced and established via seed. Because Alternative A contains no management actions to reduce or prohibit the introduction and transport of new INNS infestations, adverse, short-, and long-term impacts are anticipated to continue.

Proactive Management Actions. Management of INNS that already occur within the planning area includes the application of chemicals and other INNS control methods to remove undesirable species. Under Alternative A, protection of waters, riparian vegetation, wetlands, and special status plant species requires that chemical herbicide buffers are: 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand applications. Application of chemicals in other areas is considered on a case-by-case basis in coordination with the BLM authorized officer. Chemicals must be mixed a minimum of 500 feet from riparian areas, water sources, floodplains, and known special status plant species populations. With greater distance from sensitive resources that chemicals can be applied, either by aerial, vehicle, or hand application, INNS control may be reduced if they occur in those sensitive areas.

Alternative B

Surface-disturbing Activities. Under Alternative B, there are 106,175 acres (approximately 50% less) short-term and 47,693 acres (67% less) long-term disturbance anticipated in the planning area from BLM management actions compared to Alternative A. Under Alternative B, approximately 41-percent less acreage of federal mineral estate is administratively available to oil and gas leasing compared with Alternative A, with the majority (86%) subject to the terms and conditions of standard lease plus major constraints. The restrictions on habitat fragmentation and the fewer disturbed acres relative to Alternative

A that are anticipated would minimize the potential adverse impacts associated with the establishment and spread of INNS under Alternative B.

Under Alternative B, all surface-disturbing activities within the planning area require soil surveys and analysis, which may add to the knowledge of where existing INNS infestations occur. Alternative B requires consolidation of road networks and equipment placement to reduce surface disturbance. Similar to Alternative A, surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines; however, surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control. In addition, disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential characteristics are prohibited under Alternative B. Alternative B provides greater protection and minimizes impacts to soils, which reduce the potential for creating suitable conditions for, and the adverse impacts associated with, the establishment and spread of INNS compared with Alternative A.

To reduce the possibility of INNS establishment, interim reclamation of oil and gas surface disturbance occurs within the first planting season after the rig is moved off location. Final abandonment of well locations will occur within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related operations, reclamation occurs within the first suitable planting season after operations have ceased. If a healthy native plant community or other species as identified in an approved management plan is not established within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. Appropriate reclamation standards are developed at the project level. The sooner reclamation occurs, the sooner greater benefits to other resources will be achieved by reducing the spread of INNS. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on preexisting species composition or other species as identified in an approved management plan. Direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative B are expected to be less for this alternative than under Alternative A.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire-suppression actions, except Alternative B does not allow soil disturbance without the consent of the authorized officer. Under Alternative B, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem to meet fire and fuels management objectives the same as Alternative A, only this action will be based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. As with Alternative A, the use of prescribed fire as a management tool could result in beneficial or adverse impacts with regard to INNS, depending on whether the result is an improvement to habitat quality or an increase in INNS. Therefore, adverse impacts associated with INNS from Alternative B will be similar to those for Alternative A.

Livestock and Native Ungulate Grazing. Alternative B generally allows livestock grazing over the same area identified under Alternative A; however; areas identified for the protection of specific resource values could be unavailable for livestock grazing under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands. By making more areas unavailable for livestock grazing, this alternative reduces the potential spread of INNS relative to Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative B, decreases in recreational, OHV use, and dispersed travel opportunities will result correspondingly in the decreased transport of INNS seed into and among BLM-administered lands. Travel and use restrictions help lessen the adverse impacts resulting from INNS seed transport. Management actions under Alternative B are anticipated to have less adverse impacts to most other natural resources relative to Alternative A, and the least relative to other alternatives.

Proactive Management Actions. Under Alternative B, the distance from sensitive resources where appropriate application of chemicals is allowed is greater than under Alternative A. Since this distance is greater than Alternative A, Alternative B would likely be less effective on INNS control and, therefore, potentially have greater impacts.

In addition to the requirement for certified weed-free seed and mulch in restoration project, Alternative B also requires the use of certified weed-free forage and feeds for livestock supplements to prevent the establishment of new weed areas. This action is anticipated to have more beneficial impacts in preventing the establishment and spread of INNS relative to Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, 172,967 acres short-term and 144,467 acres long-term disturbance are anticipated in the planning area from BLM management actions. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. Under Alternative C, protection and mitigation to address surface-disturbing activities are similar to Alternative A. Oil- and gas-related activities are restricted on slopes greater than 25 percent, but NSO restrictions for fluid minerals on slopes greater than 40 percent do not occur under Alternative C. Reclamation of surface disturbance is the same as for Alternative A. Direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative C are expected to be similar to Alternative A due to the similar long-term surface disturbance anticipated under Alternative C.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. No soil disturbances are allowed during fire suppression from heavy equipment unless private or public habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment, some direct impacts are reduced. However, by not using prescribed fire, which could be used as a tool for INNS control and habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts associated with the spread and establishment of INNS of all alternatives.

Livestock and Native Ungulate Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area. Grazing system and range improvements are implemented to maximize livestock grazing. Alternative C has the greatest potential to cause direct and indirect impacts associated with the spread and establishment of INNS via livestock activities compared with all other alternatives.

Recreation, OHV Use, and Dispersed Travel. Alternative C is similar to, but less restrictive than, Alternative B. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. Travel and use restrictions help lessen the adverse impacts resulting from INNS seed transport. The anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative C from OHV use are anticipated to produce less indirect and adverse impacts compared to Alternative A.

Proactive Management Actions. Alternative C is the same as Alternative A with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. Alternative C also recommends the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock to prevent the establishment of new weed areas, resulting in greater beneficial impacts than Alternative A.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, short-term and long-term disturbances anticipated in the planning area are the second lowest of all alternatives. Alternative D allows oil and gas leasing on approximately 1,400,000 acres of federal mineral estate (slightly less than under Alternative A).

Under Alternative D, protection and mitigation to address surface-disturbing activities are the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitats. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil and gas activity restrictions are the same as Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater, and any disturbance in these areas would require additional consideration of slope stabilization and erosion control techniques. Disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential characteristics are avoided. Disturbances in these types of areas require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as for Alternative B. Overall, direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative D are expected to be less than under alternatives A and C due to less surface disturbance anticipated in the planning area, but more than Alternative B.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which provides for human health and safety and minimizing loss of property and threats to other surface owners. The plan also allows for achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). Soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem, and would result in similar impacts.

Livestock and Native Ungulate Grazing. Alternative D is similar to Alternative A, except livestock grazing on small, isolated tracts currently not permitted or leased for grazing, as well as on other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Under Alternative D, there is greater land protection, and, therefore, direct and indirect adverse impacts associated with the establishment and spread of INNS under Alternative D are expected to be less than with Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative D, motor vehicle travel and OHV use are limited to existing roads and trails similar to Alternative A; however, Alternative D implements greater restrictions to potential off-road travel. Travel and use restrictions under Alternative D lessen the adverse impacts resulting from INNS seed transport compared to Alternative A. Anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use will be similar, but slightly less than, Alternative A.

Proactive Management Actions. Alternative D is the same as alternatives A and C with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. However, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, potentially preventing the spread of INNS more than alternatives A and C, but less than Alternative B.

4.4.9.3 Conclusion

The following conclusion is based on meaningful differences in short- and long-term disturbance acreage; surface disturbance and prescribed fire management on highly erosive soils and slopes greater than 25 percent; use of certified weed-free seed, timing, and reseeding requirements in reclamation of disturbed areas; management of livestock, including areas unavailable for livestock grazing for resource protection; OHV use limitations; and management of soil disturbance during fire suppression activities: potential adverse impacts from Alternative A are anticipated to be the most adverse, followed by alternatives C and D, with impacts from Alternative B anticipated to be the least adverse with regard to the introduction and spread of INNS.

4.5 Heritage Resources

4.5.1 Cultural Resources

Cultural resources are fragile, nonrenewable evidence of past human history and heritage on the landscape. They are public resources entrusted to the BLM for protection and interpretation, providing a context for present-day land use decisions. Actions that could occur through implementing each alternative could impact cultural resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse. NHT impacts are analyzed within a subsection of the cultural resources section because of the special nature of trails management in contrast to most archeological and other historic resources. Native American concerns are briefly identified in this section and discussed in more detail in the Native American Concerns section of the chapter.

Direct impacts to cultural resources, other than historic trails, from RMP alternatives typically result from actions that disturb the soil or physically alter, damage, or destroy all or part of a resource; alter characteristics of the surrounding environment that contribute to resource significance; introduce visual or audible elements out of character with the property or alter its setting; or result in neglect of the resource to the extent that it deteriorates or is destroyed. For example, surface-disturbing activities are considered an adverse direct impact because the resource is nonrenewable; once it has been disturbed, the potential for collecting or preserving meaningful data are lost. For the purposes of this analysis, actions resulting in data collection and preservation of cultural resources other than trails could be considered beneficial impacts but, in fact, are neutral or nonadverse impacts, as the action merely maintains the status quo. A truly beneficial impact to cultural resources enhances values, such as construction of interpretive signs. Indirect impacts to cultural resources result from project-induced increases or decreases in activity in the planning area. For example, constructing a recreational facility may increase visitor use, but could result in indirect impacts to previously undisturbed cultural resources.

NHTs are subject to the same range of direct and indirect impacts as archeology and historic resources. For example, the construction of a recreational facility may increase visitor use, which could result in indirect impacts to previously undisturbed trail segments. However, NHTs are a special case in that data collection and preservation actually do provide beneficial impacts. Recreation, in particular, is a complex issue, as actions taken to preserve historic values can have both beneficial and adverse impacts for heritage tourism and trail enthusiasts.

The duration of a disturbing element or activity can be considered as short-term or long-term. A pipeline construction corridor is a short-term disturbance, as normal reclamation ultimately stabilizes the soil. A disturbance continuing beyond 5 years is considered long-term. However, as a practical matter, there is little difference between short- and long-term impacts from surface disturbance. Once a disturbance occurs to a cultural resource, the alteration is permanent. Restoration occasionally can be done in some cases, and stabilization can halt additional deterioration, but once a portion of a cultural resource is damaged, it rarely can be repaired.

For all agency undertakings with the potential to adversely impact historic properties (i.e., cultural resources that are eligible for, or listed in, the National Register of Historic Places [NRHP]), the BLM complies with Section 106 of the NHPA. Section 106 compliance typically includes a cultural resources inventory and evaluation of any resources found. If historic properties are present, the BLM consults with the State Historic Preservation Office (SHPO), interested Native American tribes, and other interested parties in developing mitigation measures for adversely affected properties. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes regarding the sensitive resources of the planning area (see Maps 28 through 31).

4.5.1.1 Methods and Assumptions

Archeology and Historic Resources

Methods and assumptions used to analyze impacts to archeology and historic resources include the following:

- Cultural resources will continue to be found throughout the planning area.
- All surface-disturbing activities could adversely impact cultural resources.
- Wildland and prescribed fire could damage rock art sites and sites comprising combustible materials.
- Protection for all cultural resources will occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the resources are specifically identified in the RMP.
- Adverse impacts to cultural resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, the projected numbers for short-term surface disturbance are used to quantify impacts to cultural resources.
- The intensity of surface disturbance by alternative, as identified in Appendix M, equates to levels of development and, in turn, increased access to public lands.

National Historic Trails

Methods and assumptions used in the NHTs impact analysis include the following:

- Protection of NHTs and related sites occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the trails are specifically identified in the RMP.
- Direct and indirect impacts can result from a variety of natural and human-caused events, such as those that physically alter, damage, or destroy all or part of the trail; improve access, bringing increased use to an area and altering characteristics of the surrounding environment that contribute to the trail's importance; the introduction of visual or audible elements out of character with the trail or that alter its setting, and neglect of the trail to the extent that it deteriorates or is destroyed.
- The intensity of surface disturbance by alternative, as identified in Appendix M, equates to levels of development and, in turn, increased access to public lands.
- BLM looks favorably at opportunities to cooperate with private landowners to minimize or eliminate disturbance to NHTs.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, all protective zones begin at the outer edges of trails, rather than a centerline, which is difficult to define.
- Certain projects, due to size or topography, may require consideration of visual intrusions into the setting beyond the foreground or middleground zones to comply with Section 106 of the NHPA.

4.5.1.2 Analysis of Alternatives

As cultural resources are impacted by management actions under each alternative, actions for cultural resources can, in turn, impact other resources. For example, constraints placed on surface disturbance on or around specific cultural sites may impact desired actions under another resource. The impacts of

cultural resources on other resource topics (e.g., physical, biological, fire and fuels management, etc.) are discussed under the appropriate impacted resources.

Archeology and Historic Resources

Impacts Common to All Alternatives

The types of impacts projected to occur to cultural resources because of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary. Therefore, impacts to cultural resources from surface-disturbing activities, such as minerals development, ROW, facilities development, OHV use, recreational, fire and fuels management, and proactive cultural resource management actions are described under individual alternatives. Essentially, any activity that creates or has the potential to create surface disturbance, regardless of the resource program to which it may be associated, can cause potential impacts to cultural resources.

Under all alternatives, all cultural properties will be categorized according to the six use categories defined in BLM Manual 8110 (BLM 1998c): Scientific Use, Conservation Use, Public Use, Traditional Use, Experimental Use, and Discharged from Public Use.

For all alternatives, management of fish and wildlife resources could have an indirect beneficial impact on cultural resources if improving fisheries and other habitats enhance the availability of traditional resources. The situation is similar for soils management, in which reducing erosion and limiting erosion of highly erosive soils help preserve archeological sites. Management of wildland and prescribed fire can directly and adversely impact cultural resources by direct disturbance from suppression, thermal effects on rock art panels, or burning sites composed of combustible materials, such as wickiups, corrals, or historic sites. Indirect impacts derive from new exposures of cultural materials, making them available for illicit collection or disruption by erosion. Beneficial impacts are possible, in that previously obscured sites are exposed and made available for recording and further management.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact cultural resources. Under Alternative A, the projected surface disturbance from BLM actions results in the highest disturbance acreage (refer to Table 4-1). The distinction between short- and long-term disturbance is not useful for cultural resources because once a site is disturbed, impacts cannot be remediated as a stream or vegetation can be restored. Moreover, the impacts to cultural resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. The net potential adverse impact to cultural resources is limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to historic properties prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential to impact cultural resources. In those cases in which an accommodation cannot be made, consultation between the BLM and the SHPO and affected interests takes place to develop and implement a treatment plan to mitigate adverse impacts to historic properties. While the treatment plan may specify data recovery, other actions, such as planned excavation, detailed recording and mapping, Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation, or interpretation are among the variety of techniques that can be used for mitigation, depending on the type of site and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection or beneficial impacts for cultural resources. For example, under Alternative A, surface-disturbing activities are reviewed on a case-by-case basis and an NSO restriction for fluid minerals is implemented on slopes greater than 25 percent without permission of the authorized officer. Management of the Bridger Antelope Trap specifies an NSO restriction for 480 acres of fluid minerals. Management plans will be developed for eligible sites, providing protection or mitigation plans for adverse impacts. Eligibility will

be decided on a case-by-case basis. Specific sites have management prescriptions: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock; and Alfred Corum emigrant gravesite. Inventories are necessary prior to all surface-disturbing activities, usually associated with the NEPA process. These management actions result in beneficial impacts to cultural resources. Therefore, additional protections for cultural resources under Alternative A are less than all other alternatives, except Alternative C.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impacts to cultural resources. The results of the survey required under Section 106 of the NHPA causes a beneficial impact to cultural resources because it generates data that promote further understanding of cultural resources in the planning area. However, if historic properties are identified during the inventory, it could result in an adverse impact because once in private ownership, there are no protective measures for cultural resources. Land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Impacts to historic properties need to be mitigated by application of a treatment plan developed through consultation between the BLM and the SHPO. In other words, cultural resource issues have to be resolved prior to any changes in land ownership. Under Alternative A, acreage of BLM-administered surface identified for disposal by sale equals that under Alternative C and is more than under Alternative D.

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote cultural resource locations leading to adverse impacts related to traffic, vandalism, and erosion. For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, the highest amount of development and increase in access occurs under Alternative A and results in an indirect adverse impact to cultural resources. Because adverse impacts to historic properties must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on cultural resources. For example, archeological sites are protected when there are access restrictions, but may be exposed to vandalism or other impacts if multiple uses increase, including exploration for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of traditional cultural resources.

OHV use on public lands, under all alternatives, indirectly impacts cultural resources. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to designated roads and trails for OHV use. Although OHV use currently is restricted in some areas, and use is limited to existing roads and trails, new trails are constantly being created and becoming part of the “existing” designation.

Alternative A does not preclude granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Alternatives B and D do restrict ROW placement through these sites.

Proactive Management Actions. Under Alternative A, an NSO restriction for fluid minerals is in place for those cultural sites within the 480-acre area of the Bridger Antelope Trap. There are no specific VRM management policies for this site. All historical, archeological and cultural sites eligible for or listed on the NRHP will be protected or impacts will be mitigated. Management plans will be developed for sites eligible for or listed on the NRHP, on a case-by-case basis. Management prescriptions exist for Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, and the Alfred Corum emigrant gravesite. These management actions are less than those provided for under alternatives B and D, resulting in a greater adverse impact.

Under Alternative A, cultural resource inventories and site evaluations are in direct response to specific land use proposals in accordance with NEPA and Section 106 of the NHPA. Additional inventory is carried out when resources permit to comply with Section 110 of the NHPA. While these actions benefit cultural resources, they are the minimum required by law.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected surface disturbance from BLM actions is the lowest of any alternative (refer to Table 4-1). As in Alternative A, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance. The impacts to cultural resources from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for cultural resources. For example, under Alternative B, an NSO restriction for fluid minerals is in place for highly erosive soils or slopes greater than 25 percent and a number of special designations protect areas from surface disturbance, as identified in Table 2-3. No wind-energy development projects are allowed within 5 miles of significant cultural areas, in contrast to Alternative A that does not restrict such development, or Alternative C, which allows wind-energy development with some restrictions. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, no BLM-administered surface area is identified for disposal. This is the only alternative with no acreage slated for disposal, resulting in indirect beneficial impacts to cultural resources.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development of any alternative (as represented by surface disturbance numbers in Table 4-1). These management actions result in indirect adverse impacts to cultural resources, but less adverse impacts than under Alternative A.

Alternative B precludes granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Alternatives A and C do not prohibit ROW through these sites. Alternative B results in an indirect beneficial impact to cultural resources.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap include closing the area to OHV use, excluding prescribed fires and vegetation treatments in the 640-acre section that includes the site, withdrawing this section from the operation of the mining laws, and preserving the viewshed within 10 miles. Alternative B prohibits establishment of ROW corridors and wind-energy projects, as well as all surface-disturbing activities, closes the area to OHV use, and excludes prescribed fires and vegetation treatments on BLM-administered lands within the defined boundaries of the following sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). This alternative adds four sites to this management category

that are not included in alternatives A or C, but are included in Alternative D, thereby beneficially impacting cultural resources.

Under Alternative B, cultural resource inventories are conducted according to a system based on high, medium, and low probability zones for cultural resources. This management action results in a beneficial impact to cultural resources. Using the Class I overview to identify high probability areas, Class III surveys are then conducted in priority areas. This plan results in survey and identification in more areas than alternatives A or C, and a similar coverage as found in Alternative D.

Cultural resource management plans developed for a number of sites will govern actions that could impact those sites: Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp; and Rocky Gap trail landmark. This is the only alternative that explicitly states that a management plan will be developed benefiting these areas. Alternative D holds out the possibility that such plans could be developed. Alternatives A and C determine whether to develop plans on a case-by-case basis. In addition, Alternative B will preserve the viewshed of these sites, as well as the Bear River Divide trail landmark and the Gateway petroglyphs within a 10-mile buffer. The objective is to ensure that the visual characteristics of the setting are uncompromised by modern intrusions by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. ROW corridors or other developments containing high-profile structures (over 12-feet high), particularly wind power, are not suitable for the area. These proactive cultural resource management actions result in additional protection and beneficial impacts to cultural resources.

The viewshed of high management level trail segments, identified NRHP-listed sites (Table 2-3), and the Bridger Antelope Trap juniper fence will be protected by a 10-mile buffer under Alternative B. In contrast, alternatives C and A manage these resources according to VRM maps from 1986, while Alternative D applies VRM classes and associated management to specific areas. Overall, Alternative B results in greater beneficial impacts to cultural resources than all other alternatives.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected surface disturbance from BLM actions is the second highest of all alternatives (refer to Table 4-1). The impacts to cultural resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Fewer restrictions on surface-disturbing activities for protecting other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C; therefore, additional protection for cultural resources under Alternative C is less than all other alternatives except Alternative A. For example, under Alternative C, surface disturbance on highly erosive soils and slopes greater than 25 percent is allowed. Alternative C does not allow for wind-energy development within the boundaries of the Bridger Antelope Trap. These types of management actions can result in beneficial or nonadverse impacts to cultural resources when management actions call for documentation or impact mitigation; however, they are less beneficial than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A. Under Alternative C, more acres of BLM-administered surface are identified for disposal by sale than under alternatives B and D. The impacts of land-tenure adjustment will be similar to those described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all alternatives. These actions result in indirect adverse impacts to cultural resources. The adverse impacts under Alternative C are less than those identified under Alternative A, but greater than all other alternatives.

Similar to Alternative A, Alternative C does not preclude granting a ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). The management actions could adversely affect cultural resources. Alternatives B and D restrict ROW placement through these sites.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap, comprising an NSO restriction for fluid minerals on 480 acres, are the same as those identified under Alternative A. Similarly, protection for the specific sites at Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, and the Alfred Corum emigrant gravesite are the same as those identified under Alternative A. No additional protective measures are identified under Alternative C for other sites specifically mentioned in alternatives B and D.

Under Alternative C, cultural resources management plans will be developed for sites eligible for or listed on the NRHP, on a case-by-case basis. This management action results in a beneficial impact to cultural resources. Class II or Class III inventories conducted in areas where expected development and (or) management decisions are likely to impact cultural sites is balanced by the exclusion of cultural resources surveys in low-site density areas for future projects. This results in a more proactive approach to inventory than Alternative A, but by completely eliminating surveys in areas with low probability for cultural resources, some resources may still be adversely impacted.

The viewshed of cultural resources and NHTs are managed according to VRM maps from 1986. All historical, archeological, and cultural sites eligible for or listed on the NRHP are protected or mitigated; the objective will be to protect the trails from visual intrusion and surface disturbance to maintain integrity of setting.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, the projected short-term surface disturbance acreage from BLM actions results in the second lowest disturbance acreage following Alternative B (refer to Table 4-1). The impacts to cultural resources from surface-disturbing activities under Alternative D are anticipated to be adverse, as is the case for all alternatives and commensurate with the RFAs as shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be less than under Alternative A. The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for cultural resources. Under this alternative, surface disturbance on highly erosive soils is minimized to the extent practicable; an NSO restriction for fluid minerals is implemented and OHV use is allowed only on the currently established road for the Bridger Antelope Trap. These types of management actions result in beneficial impacts to cultural resources. Alternative D also provides restrictions on the development of wind energy that exclude the federal section that contains the Bridger Antelope Trap and the federal sections within 3 miles of the Bridger Antelope Trap.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, acres of BLM-administered surface identified for disposal by sale are third highest, after alternatives A and C. Only Alternative B disposes of less surface (i.e., none) than Alternative D. Disposal of BLM-administered surface results in both a beneficial and adverse impact to cultural resources, as described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to cultural resources, and the impacts under Alternative D are less in intensity than those identified under Alternative A.

Alternative D precludes granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Alternatives A and C do not prohibit ROW through these sites. Alternative D results in more beneficial indirect impacts than Alternative A.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap include restricting surface-disturbing activities in the federal section (640 acres) that contains the Bridger Antelope Trap, an NSO restriction for fluid minerals in the section, and OHV use allowed only on the currently established road. Prescribed vegetation treatments could occur to protect the physical characteristics of the site. This provides more protection to the site than alternatives A and C, but less than Alternative B, where all surface-disturbing activities are prohibited and the area is closed to OHV use.

For Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres), specific sites-management actions include managing surface-disturbing activities on BLM-administered lands within the defined boundaries of the sites by implementing an NSO restriction for fluid minerals on newly issued leases, OHV use only on current established roads, and making the areas ROW exclusion zones. In addition, management prescriptions using vegetation treatments to protect or enhance the sites are allowed. In addition, Alternative D will preserve the viewshed of these sites as well as the Bear River Divide trail landmark and the Gateway petroglyphs within a 3-mile buffer. The objective is to preserve the viewshed of the sites listed, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing projects in federal sections to retain the existing character of the landscape so developments do not dominate the visible area to detract from the feeling or sense of the historic time period of the site. ROW will be designed to preserve the visual integrity of the sites consistent with the BLM visual resources handbook and manual. Developments containing high-profile structures (over 12-feet high), particularly wind power, are not suitable for the area. This management action is intended to manage developments to maintain setting qualities and not to have an exclusion zone. These management actions result in an indirect beneficial impact to cultural resources.

Alternative D has the possibility of developing cultural resource management plans for sites eligible for or listed on the NHRP, specifically the Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, and Rocky Gap trail landmark. The Class I overview will be used to identify zones of high, medium, and low probability for cultural sites and to identify where current and future land uses threaten cultural sites. This methodology is based on NHPA Section 110, proactive inventories. Additional consultation with SHPO would help develop a model for this type of inventory. Class III inventories are to be conducted in zones where the greatest threats to cultural resources exist. This

management action results in a beneficial impact to cultural resources. It is a more pro-active plan than alternatives A and C, and is similar to Alternative B.

VRM Class II areas are specifically defined for management of sensitive cultural resources, including the northwest portion of the planning area north and east of U.S. Highway 30. In addition, the federal section that contains the Bridger Antelope Trap and the federal sections within 3 miles of the Bridger Antelope Trap are considered VRM Class II in consideration of sensitive cultural resources and the views from those resources.

National Historic Trails

Alternative A

Surface-disturbing Activities. Under Alternative A, the impacts to NHTs from surface-disturbing activities are anticipated to be commensurate with the intensity of RFAs shown in Appendix M. Under Alternative A, the projected short-term surface disturbance from BLM actions is the highest of all alternatives (refer to Table 4-1). Moreover, the impacts to NHTs from surface disturbance projected for Alternative A are anticipated to be primarily adverse. The potential adverse impact to trails is somewhat limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to trail segments contributing to the overall importance prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential impact to NHTs.

In those cases in which an accommodation cannot be made to preserve the trail, consultation between the BLM and the SHPO and affected interests takes place to develop and implement a treatment plan to mitigate adverse impacts to contributing segments. While this often results in project relocation, detailed recording and mapping or interpretation are some of the techniques that have been used for mitigation, depending on the specific trail segment and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for trail resources. For example, under Alternative A for soils, surface-disturbing activities may be modified, timing restrictions implemented, or surface disturbance in selected areas prohibited. However, fewer restrictions on surface-disturbing activities are provided for under Alternative A as compared to alternatives B and D; therefore, additional protection for NHTs under Alternative A is less than all other alternatives.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impact to NHTs. Under Alternative A, 59,508 acres are identified for disposal. The results of the survey required under Section 106 of the NHPA produce a beneficial impact to cultural resources because they generate data that further understanding of trail resources in the planning area. If contributing segments were identified during the inventory, it could result in an adverse impact because once in private ownership, there are no protective measures for cultural resources. However, land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Impact mitigation for trail segments contributing to the overall NRHP eligibility might include application of a treatment plan developed through consultation between the BLM and the SHPO. Acquiring lands within the planning area could result in a beneficial impact to cultural resources in that additional sites may be obtained in the newly acquired lands.

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote trail segments, possibly leading to adverse impacts related to traffic, vandalism, and erosion. For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the highest amount of development and increase in access occurs under Alternative A and

results in indirect adverse impacts. Since adverse impacts to important trail segments must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on trail resources. For example, trail segments are protected when there are access restrictions, but may be exposed to vandalism or other impacts if multiple uses increase, including exploring for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of NHTs for activities, such as heritage tourism.

OHV use on public lands, under all alternatives, indirectly impacts NHTs. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to existing roads and trails for OHV use. Although OHV use currently is restricted in some areas, and use is limited to existing roads and trails, new trails are continuously created and become part of the "existing" designation.

Under Alternative A, ROW corridors are not designated and land use authorization is granted on a case-by-case basis. This is in contrast to alternatives B, C, and D, which specify treatment in relation to NRHP sites and NHTs (alternatives B and D) or on historic utility corridors (Alternative C).

Proactive Management Actions. Proactive management actions under Alternative A generally result in beneficial impacts to NHTs. Under existing management, the BLM's objective is to protect the trails from visual intrusion and surface disturbance and to maintain the integrity of setting. Generally, visual intrusion and surface disturbance are restricted or prohibited within ¼ mile of a historic trail or within the visual horizon of the trail, whichever is closer. Topography and existing surface disturbance are factors in determining the corridor characteristics. Since trails often comprise multiple traces, the ¼-mile zone extends from the outer edges of the overall trace.

Of the four NRHP-listed sites associated with NHTs, Emigrant Springs and Johnston Scout Rock are located on BLM-administered land. Eight sites have interpretive signs as NHTs. Management of NHTs emphasizes preservation coupled with increased visitor use and appreciation of the trail system. These management actions result in a beneficial impact.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected disturbance acreage from BLM actions is the lowest of any alternative (refer to Table 4-1). The impacts to NHTs from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M when they coincide with trails. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for NHTs. Using soils, for example, under Alternative B, an NSO restriction for fluid minerals is implemented for highly erodible soils and long-term surface disturbance is limited. These types of management actions result in beneficial impacts to NHTs.

ROW corridors may not be designated where they conflict with NHT management objectives. Wind-energy development projects are prohibited in areas that contain high resource values, including a number of trail-related archeological sites and high management level trail segments. These management actions result in a beneficial impact to NHTs.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, no BLM-administered surface is identified for disposal by sale,

compared with Alternative A, where acreage is slated for disposal. Maintaining BLM jurisdiction over NHTs is beneficial, since the BLM must comply with federal laws, such as the NHPA, that require impact mitigation in response to adverse effects. Similarly, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development by alternative (as represented by surface disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to NHTs, but a less adverse impact than under Alternative A.

Proactive Management Actions. The guiding principal of NHT management under Alternative B is to develop and enhance high management level segments and sites by installing directional signs to trail segments from main roads, trail markers at trail traces, and interpretative signs. In addition, Alternative B calls for acquiring legal access for public visitation to trail segments and developing a stewardship program to lead trail tours, monitor sites, and generally assist with management, benefiting NHTs.

Under Alternative B, trail segments are ranked according to management level, with restrictions based on their rankings. This alternative protects the physical evidence of NHTs (ruts/traces, graves, campsites, landmarks) by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances: (1) segments with high management level (1 mile on each side of trail segments and within a 1-mile radius of gravesites and landmarks); (2) segments with medium management level (½ mile on each side of trail segments and within a ½-mile radius of gravesites and landmarks); and (3) segments with low management level (¼ mile on each side of trail segments). These distance restrictions are greater than for any other alternative and, therefore, benefit NHTs more than the other alternatives.

The following trail-related sites are closed to ROW placements within their boundaries: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). This management action results in a beneficial impact to NHTs.

Alternative B provides for identifying the Oregon-California National Historic Trail Special Recreation Management Area (SRMA), to be created and managed to protect the historic value of the trails, while providing for interpretive opportunities benefiting NHTs. NHT heritage tourism will be the focus of the Dempsey Ridge SRMA in addition to preserving traces and settings of NHTs and associated sites. For NHTs and site settings, all surface-disturbing activities will be managed to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. Alternative A identifies no SRMAs. Emigrant Spring/Dempsey and the Alfred Corum and Nancy Hill emigrant gravesites have NSO restrictions for fluid minerals; salt licks are not allowed. These management actions result in beneficial impacts compared to Alternative A.

Under Alternative B, VRM Class II areas are established within a 3-mile buffer of NHTs. Alternative B provides the greatest area of protection to NHT viewsheds, which are to be managed as follows. First, preserve the viewshed within 10 miles of high management level segments, where the visual characteristics of the setting are uncompromised by modern intrusions, by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic period of the trail setting. ROW will be designed to preserve the visual integrity of the settings consistent with the BLM visual resources handbook/manual. The settings are not suitable for developments containing high-profile structures (over 12-feet high) particularly wind power. Second, preserve the viewshed within 5 miles of segments with medium management level by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer. Third, preserve the viewshed within ½ mile of segments with

low management level by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer. These management actions result in beneficial impacts compared to Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short-term disturbance acreage from BLM actions results in the second highest disturbance acreage of all the alternatives (refer to Table 4-1). The impacts to trail resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. No surface-disturbing activity is permitted without prior compliance with Section 106 of the NHPA.

More restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C than under Alternative A; therefore, additional protection for cultural resources occur under Alternative C compared to Alternative A. These types of management actions can result in beneficial or nonadverse impacts to cultural resources; however, to a lesser extent than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative C, the same number of acres of BLM-administered surface land is identified for disposal by sale as Alternative A, which could have the greatest adverse impact to NHTs of all alternatives. Disposal of BLM-administered surface results in adverse impacts to NHTs as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership. As noted above, the high value of NHTs prevents their inclusion in land-tenure adjustments.

ROW corridors are not restricted, and could be designated where they conflict with NHT management objectives. Wind-energy development projects may be placed throughout the planning area. These management actions may result in adverse impacts to NHTs.

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all the alternatives. These actions result in an indirect adverse impact to NHTs. The adverse impacts under Alternative C are less than those identified in Alternative A.

Proactive Management Actions. Under Alternative C, management of NHTs is the same as for Alternative A, including maintaining existing interpretive sites; therefore, impacts are similar. Under Alternative C, management actions protect the physical evidence of NHTs (ruts/traces, graves, campsites, landmarks) by prohibiting or restricting surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the distances specified below. The definition and management of the corridor may depend on topography and existing surface disturbance as follows: (1) Segments with high management level—¼ mile on each side of trail segments and within a ¼ mile radius of gravesites and landmarks. (2) Segments with medium management level—500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Segments with low management level—100 feet on each side of trail segments. Crossings at right angles to trails could be permitted on a case-by-case basis. These management actions result in an overall beneficial impact to NHTs.

Alternative C manages the viewsheds of NHT segments with project-specific analysis to determine level of restrictions within distances prescribed, resulting in beneficial impacts. First, manage the viewshed to retain the existing character of the landscape in federal sections so developments do not dominate the

visible area to detract from the feeling or sense of the historic period of the trail setting within 1 mile or the visual horizon of high management level segments where the visual characteristics of the setting are uncompromised by modern intrusions. Second, manage the viewshed to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer within ¼ mile or the visual horizon of segments with medium management level. Third, for segments with low management level, manage the viewshed in accordance with the designated VRM class.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. Under Alternative D, the projected disturbance acreage from BLM actions results in the third highest disturbance acreage (refer to Table 4-1). The impacts to trail resources from surface-disturbing activities under Alternative D are anticipated to be adverse, as is the case for all alternatives, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be less than under Alternative A. The net potential disturbance to NHTs is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for cultural resources. For example, actions selected to minimize adverse effects to soils include relocating disturbance in areas of erodible soils and limiting total long-term disturbance. These types of management actions result in beneficial impacts to NHTs.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, fewer acres of BLM-administered surface are identified for disposal than for alternatives A and C. Disposal of BLM-administered surface results in adverse impacts to NHTs as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership.

ROW corridors will not be designated where they conflict with NHT management objectives. Wind-energy development projects are restricted to certain corridors, and prohibited in federal sections containing high management level NHT segments, including trail-related archeological sites and high management level trail segments. These management actions result in beneficial impacts to NHTs.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface-disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to NHTs; however, the impacts under Alternative D are less in intensity to those identified in Alternative A.

Proactive Management Actions. Management of NHTs protects the physical evidence of NHTs designated under the National Trails System Act (ruts/traces, graves, campsites, landmarks) that exist on lands within federal jurisdiction by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances: (1) Segments with high management level—¼-mile on each side of trail segments and within a ¼-mile radius of gravesites and landmarks. (2) Segments with medium management level—500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Segments with low management level: 100 feet on each side of trail segments and within a 100-foot radius of gravesites and landmarks. Crossings at right angles to trails could be permitted on a case-by-case basis. This could require boring beneath the trail trace. These management actions result in beneficial impacts to NHTs.

The following trail-related sites are closed to ROW placements within their boundaries: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres),

Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Emigrant Spring/Dempsey and the Alfred Corum and Nancy Hill emigrant gravesites have NSO restrictions for fluid minerals. See the VRM Section for more detail. These management actions result in beneficial impacts to NHTs.

VRM of NHTs for Alternative D includes a number of visual corridors resulting in beneficial impacts: (1) a visual corridor extending up to 1 mile either side of the Sublette Cutoff and the Slate Creek Cutoff north of U.S. Highway 189 and east of Slate Creek Ridge in consideration of NHT views; (2) a visual corridor in the northwest portion of the planning area north and east of U.S. Highway 30 (excluding the Raymond Mountain WSA and the industrialized area west of the town of Kemmerer), defined in consideration of sensitive NHT segments; (3) a visual corridor extending up to 1 mile either side of the Oregon-California Trail in blocked federal lands south of U.S. Highway 30 and west of U.S. Highway 189 (Bear River Divide area), defined in consideration of sensitive NHT resources and views from NHTs; and (4) a visual corridor on federally administered lands extending up to 1 mile either side of the Oregon-Mormon-California Trail south of Interstate Highway 80 (I-80) and east of Bigelow Bench in Uinta County, defined in consideration of sensitive NHT and cultural resources views. The specific management provisions for NHT viewsheds is a decision under the VRM.

Alternative D provides for a wide range of protection to NHT viewsheds. These management actions are intended to manage developments to maintain setting qualities and not to have an exclusion zone. These proactive management actions result in more beneficial impacts compared to Alternative A.

Alternative D provides for identifying the Oregon-California National Historic Trail SRMA to be created and managed to protect the historic value of the trails, while providing for interpretive opportunities. The Dempsey Ridge SRMA would include monitoring of historic sites as a priority. Alternatives A and C identify no SRMAs. Alternative D is anticipated to have greater beneficial impacts to NHTs than Alternative A.

4.5.1.3 Conclusion

Archeology and Historic Resources

Allowable uses and management actions described in this section for the various alternatives are used to determine the potential impacts to cultural resources. Meaningful differences in surface-disturbing activities, land-tenure adjustments, access, and proactive management actions form the basis for the following conclusion. Impacts to cultural resources from the alternatives are anticipated to be similar in type, but different in intensity, whereas proactive cultural resource management actions result in beneficial impacts across all alternatives overall. Potential adverse impacts to cultural resources under Alternative B are anticipated to be the least adverse of all alternatives. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes. Actions required by the NHPA and the Wyoming State Protocol will form the foundation of all project-specific decisions regarding cultural resources. Conflicts between cultural resources and other resource uses not covered by the RMP will be resolved by the Wyoming State Protocol and provisions in the NHPA. The greatest adverse impacts to cultural resources are anticipated under alternatives A and C.

National Historic Trails

Meaningful differences in land disposal and acquisition, access, and proactive management actions form the basis for the following conclusion. Impacts to NHTs from the alternatives are anticipated to be similar in type, but different in intensity. Among the management alternatives, Alternative B provides a greater level of protection and preservation for NHTs resources, Alternative D provides somewhat fewer protections, and alternatives A and C provide the fewest protections. Alternative A permits beneficial surface disturbance on the NHTs, but does not provide additional viewshed protections. Alternative D provides protections where a historic setting contributes to the NRHP eligibility of a trail or trail segment

based on management levels of high, medium, and low. High management level NHT trail segments are included for Class II VRM. Development projects could cross NHTs at right angles in areas of existing disturbance, with specific effects evaluated on a case-by-case basis. Under Alternative D, mineral leasing continues, but surface-disturbing activities that do not benefit the preservation and (or) interpretation of the trails are limited based on management level. Fences and other range improvements are permitted if they cause no new disturbance and if they can be agreeable with applicable VRM class.

4.5.2 Native American Concerns

Impacts to Native American traditional resources or sacred sites are identified in consultation with tribes. The BLM consults with the Eastern Shoshone, Northern Arapaho, Shoshone Bannock, and Northern Ute tribes to identify potential impacts to sites of cultural concern on BLM-administered lands.

4.5.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All tribal-sensitive sites in the planning area have not been identified.
- Identification of tribal sensitive sites will benefit heritage resources.
- Tribal consultation benefits heritage resources.

4.5.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact Native American traditional resources include all surface-disturbing activities, access, and proactive management actions.

Impacts Common to All

For all alternatives, failure to identify potentially culturally sensitive sites and consult with the appropriate tribal entity could result in the loss of cultural sites that have traditional or sacred importance to Native Americans. Impacts may include surface disturbance, loss of access, increased access to non-traditional users, or changes in setting. In all cases, consultation may mitigate some or all of these impacts. In addition, under any alternative, the BLM will comply with the NHPA, including identification, consultation, evaluation, and impact mitigation of NRHP-eligible or culturally sensitive resources.

Alternative A

Alternative A emphasizes consultation on project-specific impacts. Under the current management practice, proposed actions are evaluated for their potential to impact culturally sensitive sites on a project-by-project basis. Once a project has been identified, consultation among the BLM, interested tribes, and the project proponents helps identify potential impacts and protection measures. Protection measures are not implemented until the project goes forward.

Surface-disturbing Activities. Current guidelines for identifying areas that are sensitive to surface-disturbing activities provide some protection for what could be sensitive sites. Slope restrictions to oil- and gas-related activities reduce impacts to archeological sites. As the BLM consults with Native Americans on extractive resource exploration projects throughout the planning area, the BLM may add stipulations or require impact mitigations, benefiting Native American traditional resources.

Access. Alternative A includes no access restrictions specifically instituted to address Native American concerns or other cultural resources. Should access to resources of Native American concern become problematic, the BLM will institute consultation.

Proactive Management Actions. Consultation occurs on a project-by-project basis, but is predicated on existing relationships among the tribes and BLM. Although the BLM does not consult with Native Americans until a project is identified, the ongoing nature of the consultation and compliance with the relevant federal laws and regulations (e.g., NHPA, American Indian Religious Freedom Act [AIRFA],

Native American Graves Protection and Repatriation Act [NAGPRA]) will help address issues as they arrive. Consultation at the inception of projects also will ensure that all parties are well-informed and can work together, benefiting Native American concerns.

Alternative B

This alternative proposes ethnographic research and consultation between the BLM and Native Americans in advance of projects, with the goal of identifying specific topics and sites of concern. In addition to identifying specific resources, research and consultation will develop preservation and protection measures, resulting in greater beneficial impacts to Native American traditional resources than Alternative A.

Surface-disturbing Activities. Alternative B provides the greatest restrictions on development, which results in the greatest potential protection of sites of cultural concern to Native Americans. Withdrawal of lands from operation of the mining laws, such as the BLM-administered parts of the Bridger Antelope Trap, also ensures protection for these resources that could be of traditional importance.

Access. The result of access and development restrictions instituted under Alternative B could be contradictory. Access limitations preserve sensitive cultural resources from casual damage, looting, or development. Limitations that preserve viewsheds around NRHP-listed sites, such as the Triangulation Point Draw District and the Bridger Antelope Trap, also have the effect of preserving those aspects of these resources that could make them of concern to Native Americans. However, access limitations could also result in Native Americans losing access or facing limitation to the use of traditional resources or sites.

Proactive Management Actions. This alternative requires ethnographic research and consultation in advance of projects. The result should be that land managers will know the location and importance of sensitive cultural resources that are important to Native Americans prior to making land management decisions, including the review and issuance of permits. In addition, by managing plant and animal resources with conservation in mind, Alternative B conserves these resources that could be of traditional subsistence concern to Native Americans more than Alternative A.

Alternative C

Alternative C relies on knowing what site types and resources are of concern to Native Americans and are likely to be encountered in advance of projects. If an area is sensitive for specific resource types, then the BLM would conduct consultation on a project-by-project basis.

Surface-disturbing Activities. With the greatest amount of acreage open to oil, gas, and other leasable resources with standard or moderate stipulations, this alternative has the potential for encountering the greatest number of cultural resources of concern to Native Americans. The resulting extensive consultation would be followed by appropriate impact mitigations.

Access. Alternative C is similar to Alternative A in number of acres closed to OHV use and areas where OHV must stay on existing roads. However, it also opens additional acreage, which could provide access to culturally sensitive sites. Limits on access are less likely under this alternative.

Proactive Management Actions. As with Alternative A, consultation occurs on a project-by-project basis, but is predicated on existing relationships among the tribes and the BLM. An important difference is that consultation might not occur if research indicates that an area is unlikely to have site types of interest to Native Americans. Should this assumption be mistaken, trying to consult after a project has begun can complicate both the relationship and the project schedule. Although the BLM does not consult with Native Americans until the need is identified, the ongoing nature of the consultation and compliance with the relevant federal laws and regulations (e.g., NHPA, AIRFA, NAGPRA) will help address issues as they arrive.

Alternative D (Preferred Alternative)

Under Alternative D, the BLM and concerned Native Americans consult both proactively and on a project-by-project basis. As the BLM identifies areas of low, medium, and high sensitivity for the presence of resources of Native American concern, project consultation occurs only on those projects with an anticipated effect. Eventually, the BLM and Native Americans from concerned tribes will develop programmatic agreements on management of these resource types. Such an agreement would include protection measures that the BLM would agree to implement. Until the specifics of the programmatic management are determined, the BLM plans to consult with Native Americans on a project-by-project basis depending on the project location, predicted site types, and possible protection measures.

Surface-disturbing Activities. Alternative D closes more acres to leasable resources than alternatives A and C, but only one-quarter as many as Alternative B. This increases the possibility of impacts to cultural resources of concern to Native Americans. However, it protects the viewsheds of almost as many acres as Alternative B.

Access. Trail usage by OHVs is similar to alternatives A, B, and C, resulting in little change to the accessibility of sensitive sites to casual looting or damage from overuse. Grazing could continue throughout the planning area, with review and possible exceptions made for sensitive resource areas. Access limitations are unlikely to affect Native American use of traditional or sensitive resources.

Proactive Management Actions. By planning to create and implement programmatic management developed through consultation, the BLM does two things. First, the basis for consultation is a partnership between the BLM and the interested tribes, which is in the spirit as well as the letter of the overarching legislation that requires consultation. Second, by being proactive in thinking through possible locations, site types, and situations, the BLM and the tribes confront the variety of situations that will require consideration in administering the RMP.

4.5.2.3 Conclusion

Under the existing conditions of Alternative A, project-by-project consultation can be time-consuming and may be difficult to integrate with a project schedule. Alternative B protects the greatest number of acres and, by extrapolation, the greatest number of sites that may be of concern to Native Americans. It calls for ethnographic research, which may identify site types, and consultation with tribes to develop preservation and protection measures. However, it still addresses protection and preservation of sites individually; given the large number of sites present throughout the planning area, cultural resources management under this alternative may not be able to keep up with identification. Alternative C allows surface disturbance over the second largest acreage, which will result in the second greatest need for consultation, identification, and implementation of preservation plans.

Finally, Alternative D approaches cultural resource management from a programmatic perspective, an approach that identifies Native American concerns and sensitive sites, allowing consultation to occur in advance of projects and provides a management plan likely to be based on maximum resource knowledge and likely to be implemented.

4.5.3 Tribal Treaty Rights and Trust Responsibilities

The Kemmerer Field Office coordinates and consults regularly with appropriate Native American groups to identify and consider their concerns in BLM land use planning and decisionmaking. Interested tribes review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans; however, no treaty rights pertain directly to BLM-administered lands within the planning area.

Impacts to tribal treaty rights and trust responsibilities can include, but are not limited to, limitations on access to tribal hunting, fishing, or resource collection areas reserved by treaty, economic issues, and

other resource use and access issues. Impacts are identified in consultation with the appropriate tribal groups.

4.5.3.1 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- No tribal treaty rights apply to BLM-administered lands in the planning area.

4.5.3.2 Analysis of Alternatives

Because no treaty rights apply directly to the planning area, the alternatives resemble each other in having no effect on tribal treaty rights. Differences in the treatment of cultural resources, level of consultation, and other issues of concern to Native Americans are discussed in the preceding section and throughout the Heritage Resources section.

4.5.3.3 Conclusion

No tribal treaty rights or trust responsibilities are known within or mandated by the Kemmerer Field Office. Management actions on the part of the BLM will have no impact on such rights. Each alternative has measures to protect cultural resources, including those related to traditional uses and practices. These are discussed and analyzed in the Heritage Resources section.

4.5.4 Paleontological Resources

Much of the lands managed by the BLM in the planning area have badlands topography or exposed bedrock, resulting in a higher potential for the discovery of fossil localities than on most private lands. Direct impacts to paleontological resources from RMP alternatives typically result from actions that physically alter, damage, or destroy fossils or their contexts. For example, any type of surface disturbance in an area containing fossil resources could have a direct impact by disturbing important paleontological values. These actions also may have an indirect impact by providing greater access to the area, which can bring increased vandalism, removal of materials, and inadvertent damage that could impact fossils or their contexts. Conversely, actions that result in data collection and preservation of paleontological resources can be considered beneficial impacts.

4.5.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Scientifically important fossils will continue to be found within the planning area.
- Adverse impacts to paleontological resources occur from physical damage or destruction of fossils, from loss of related scientific data, and from transfer of surface estate from public ownership.
- Adverse impacts to paleontological resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, it is valid to use the projected numbers for short-term surface disturbance to quantify impacts to paleontological resources. Erosion resulting from long-term surface disturbance or from naturally occurring climatic events can adversely impact paleontological resources, but not to the extent of short-term surface disturbance.
- In some cases, paleontological surveys are required prior to authorizing surface-disturbing activities. These surveys, and monitoring of construction, sometimes result in identification of information about the resource that would otherwise not be available, as well as result in the collection and curation of fossils for further research. In these cases, surface-disturbing activities, along with avoidance or full mitigation, can provide a benefit to the resource.
- In some cases, surface-disturbing activities, such as mining, can have the beneficial effect of exposing fossils that would have otherwise remained undiscovered.

4.5.4.2 Analysis of Alternatives

Allowable uses and management actions that could impact paleontological resources include all surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions.

Impacts Common to All Alternatives

The types of impacts projected to occur to paleontological resources because of the alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to paleontological resources from surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions are described under the individual alternatives.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact paleontological resources. Under Alternative A, the projected short-term surface disturbance from BLM actions results in the highest disturbance acreage of all alternatives (refer to Table 4-1).

The intensity of impacts to paleontological resources from surface-disturbing activities under Alternative A is anticipated to be similar to the RFAs shown in Appendix M. Moreover, the impacts to paleontological resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. However, it should be noted that mitigation of adverse impacts often results in data collection, recovery of significant fossils, and (or) preservation of paleontological resources, which could result in a small beneficial impact to the resource.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for paleontological resources. For example, under Alternative A, oil- and gas-related activities are restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals applies to slopes greater than 40 percent. This and other management actions of this type result in beneficial impacts to paleontological resources because they limit the potential for disturbance.

Land Disposal and Acquisition. Since fossils are considered part of the surface estate, disposal of public surface containing known or previously undocumented paleontological resources results in an adverse impact to paleontological resources due to the loss of fossils and the lack of protective measures for paleontological resources when under private ownership. Under Alternative A, the greatest acreage is identified for disposal. Compared to the remaining alternatives, Alternative A represents the same impact as Alternative C, and a greater impact than alternatives B and D. Conversely, any acquisition of lands within the planning area that contains paleontological resources results in a beneficial impact to paleontological resources due to the protective measures offered under federal ownership and the gain of public fossils.

Access. General development (e.g., recreational facilities and mineral development) and OHV use result in increased access to public lands and, therefore, adverse impacts to remote paleontological resources occur. For example, paleontological localities are protected when there are access restrictions, but may be exposed to vandalism and erosion with increased access.

For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the highest amount of development and increase in access will occur under Alternative A and result in an indirect adverse impact to paleontological resources.

OHV use on public lands, under all alternatives, has the potential to directly and indirectly impact paleontological resources. Impacts of OHV use are primarily anticipated to be adverse. Direct impacts occur when vehicles repeatedly run over exposed fossils on a trail and indirect impacts occur from accelerated erosion and degradation due to exposure. Alternative A identifies the largest area for OHV use limited to existing roads and trails (Table 2-1). Although use is limited to existing roads and trails, new trails are constantly being created and become part of the "existing" designation throughout the planning area. When new trails are created, direct impacts may occur to paleontological resources on the surface. For this reason, increased access to remote locations under this OHV designation is more likely to occur.

Proactive Management Actions. Under Alternative A, current management practices continue. Existing management would continue to provide for paleontological research, limited recreational collection of common invertebrate and plant fossils, free use of limited amounts of petrified wood, and protection of significant fossils, as determined through a graded classification of significance (see Paleontological Resources in Chapter 3), However, management actions under Alternative A are slightly less protective than under alternatives B and D.

Alternative B

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative B are anticipated to be adverse (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative B is anticipated to be less than under all other alternatives. Under Alternative B, the projected short-term disturbance acreage from BLM actions is the lowest of any alternative (refer to Table 4-1).

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for paleontological resources. For example, under Alternative B surface-disturbing activities are prohibited on sensitive or highly erosive soils or on slopes greater than 10 percent unless an adequate soil mitigation proposal is provided. In addition, the current NSO restriction for fluid minerals on slopes greater than 40 percent will continue under Alternative B. This and other similar management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative B are the same as those identified under Alternative A. In general, disposal of public surface results in an adverse impact to paleontological resources and acquisition results in a beneficial impact. Unlike alternatives A, C, and D, Alternative B does not identify any public surface for disposal. As such, there is only the potential for a beneficial impact through the acquisition of additional public surface.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative B are the same as those identified under the other alternatives. However, Alternative B proposes the least amount of development by alternative (as represented by surface-disturbance numbers in Table 4-1) and provides the second smallest area for OHV use limited to designated existing roads and trails. These actions result in direct and indirect adverse impacts to paleontological resources, but a less adverse impact than in alternatives A, C, and D.

Proactive Management Actions. Under Alternative B, no new interpretive facilities are constructed; additional stipulations on permits are considered on a case-by-case basis; the BLM proactively identifies and designates areas of high paleontological values and applies NSO restrictions for fluid minerals and other management conditions, as needed; and the BLM retains public surface with important paleontological values. These proactive management actions result in a beneficial impact to

paleontological resources. The proactive management actions under Alternative B are more protective than those identified under Alternative A, and the most protective of all alternatives.

Although Alternative B is similar to the rest of the alternatives in that it will continue existing proactive management actions, it increases the intensity of such actions due to the establishment of the Bear River Divide MA. In addition, a paleontology management plan would be completed for the new MA that would further scientific studies and provide for public education opportunities in the area. Alternative B also would designate the Fossil Basin ACEC for the preservation and research of fossil resources. As such, Alternative B is more protective than alternatives A, C, and D.

Alternative C

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative C are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. Under Alternative C, the projected short-term disturbance acreage from BLM actions result in the second-highest disturbance acreage of all the alternatives (refer to Table 4-1).

Fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C; therefore, additional protection for paleontological resources under Alternative C is less than all other alternatives. For example, under Alternative C, oil- and gas-related activities are restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals applies to slopes greater than 40 percent. This management action results in an adverse impact to paleontological resources because it opens more BLM land to surface-disturbing activities. When compared to alternatives B and D, Alternative C is less protective of paleontological resources.

Land Disposal and Acquisition. The acreage of public surface identified for disposal under Alternative C is the same as is identified for disposal under Alternative A. As such, impacts to paleontological resources due to the disposal of public surface would be the same as the impacts expected under Alternative A, and greater than under alternatives B and D. As described in Alternative A, disposal of public surface results in an adverse impact, and acquisition results in a beneficial impact, to paleontological resources.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative C are the same as those identified under other alternatives. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all alternatives. Alternative C designates the second highest acreage to OHV use limited to existing roads and trails.

Proactive Management Actions. Under Alternative C, current management practices continue as identified for Alternative A. As such, existing management would continue to provide for paleontological research, limited recreational collection of common invertebrate and plant fossils, and protection of significant fossils, as determined through a graded classification of significance (see Paleontological Chapter 3). In addition, management actions under Alternative C are slightly less protective than under alternatives B and D.

Alternative D (Preferred Alternative)

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative D are anticipated to be adverse and similar in type to all alternatives (as identified in Appendix M). Under Alternative D, the projected short-term disturbance acreage from BLM actions results in the second-lowest disturbance acreage following Alternative B (refer to Table 4-1). As

a result, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative D is anticipated to be less than under alternatives A and C and more than Alternative B.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for paleontological resources. For example, under Alternative D, surface use is restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals is in place on slopes greater than 40 percent. As with other alternatives, these types of management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The acreage of public surface identified for disposal under Alternative D is less than the acreages identified for disposal under alternatives A and C. As such, impacts to paleontological resources due to the disposal of public surface under Alternative D would be less than the impacts expected under alternatives A and C, but greater than the impacts expected under Alternative B. Similar to other alternatives, the acquisition of additional public surface results in a beneficial impact to paleontological resources.

Access. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface-disturbance numbers in Table 4-1), and Alternative D designates the third-highest acreage (along with Alternative C) to OHV use limited to existing roads and trails.

Proactive Management Actions. Alternative D is similar to alternatives A and C. However, proactive paleontological resource management actions also would include the use of current and future inventory data to identify and, if necessary, designate specific site(s) for protection. As such, Alternative D is more protective than alternatives A and C, but less protective than Alternative B.

4.5.4.3 Conclusion

Meaningful differences in surface-disturbing activities, disposal and acquisition, access, and proactive management form the basis for the following conclusion. Impacts to paleontological resources from the alternatives are anticipated to be similar in type, but differ in intensity. Proactive paleontological resource management actions result in beneficial impacts across all alternatives. Potential impacts to paleontological resources under Alternative A are anticipated to be the most adverse, whereas potential impacts from Alternative B are anticipated to be the least adverse. Potential adverse impacts to paleontological resources from Alternative C are anticipated to be similar in intensity and slightly less than Alternative A. Adverse impacts from Alternative D are anticipated to be greater than Alternative B, but less than alternatives A and C.

4.6 Land Resources

4.6.1 Lands and Realty

The following discussion highlights the primary differences between alternatives and their anticipated impacts on the lands and realty program. Included in the lands and realty program are land-tenure adjustments (e.g., sales, exchanges, acquisitions), land use authorizations (e.g., leases and permits), and withdrawals. Changes to the lands managed by the Kemmerer Field Office as a result of lands and realty activities could occur as follows: (1) land use authorizations could involve approvals to use BLM-administered land for various purposes; (2) land ownership adjustments could change ownership of land and, thus, authority over land management decisions involving local governments and the private sector; and (3) withdrawals could be set aside, withheld, or public lands could be used for public purposes that would prevent certain land use changes and development. This section focuses on how other resources potentially impact the lands and realty program by limiting or preventing realty actions. Refer to Maps 32 through 36 for lands and realty.

The purpose of the lands and realty program is to facilitate management of the lands and resources of the Kemmerer Field Office. The program adapts according to changing land management and resource needs and issues. As such, lands and realty program actions generally result in beneficial impacts within the planning area with regard to multiple use objectives. However, the majority of the workload currently accomplished in the lands and realty program is directly related to the high priority given to energy development. For that reason, land tenure adjustments, including sales and exchanges, as well as recreation and public purpose (R&PP) leases and other types of authorizations, are difficult to complete. In addition, the presence of other resources could prevent lands and realty actions from being carried out; therefore, they also are considered an adverse impact on the lands and realty program.

The only types of direct impacts to the lands and realty program are resources that prevent or make it considerably more difficult to complete a transaction. For example, mitigating resource values required for a land-disposal transaction substantially increase processing costs and timeframes required to complete the transaction and temporarily delay the transaction; this is a long-term impact. Generally, no indirect impacts to the lands and realty program exist.

4.6.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The demand for land tenure adjustments will increase, but the BLM's ability to respond to or to satisfy increased demands for land sales and exchanges will be limited by budget and by personnel constraints into the foreseeable future.
- Land acquisition is conducted by the lands and realty program as a support function to carry out the goals and objectives of other resources programs (e.g., cultural resources, fish and wildlife, recreation).
- Land-tenure adjustments (e.g., retention, disposal, acquisition) focus on disposing scattered parcels and acquiring lands to consolidate ownership, providing lands for community expansion, and improving management opportunities.
- In general, the lands and realty program is based on the requirements of resources and adjusts to accommodate them; however, when resources prevent or make it considerably more difficult to complete a transaction under the lands and realty program (e.g., when mitigation is required for a land-disposal transaction), these restrictions are considered adverse impacts to the lands and realty program.
- The number of land use authorizations will increase over the life of the plan.

- Existing withdrawals to other federal agencies will continue.
- The resource management actions having the most potential to affect lands and realty include cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, and special designations.

4.6.1.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact lands and realty primarily include restrictions prohibiting or delaying lands and realty transactions.

Impacts Common to All Alternatives

The lands and realty program alternatives will result in a broad range of actions that could cause some changes to existing land uses (e.g., new development) over time, both directly and indirectly. The following discussions summarize the primary differences between the alternatives with respect to general land use changes potentially associated with each of these factors.

Land ownership adjustments consolidate the relatively fragmented public land ownership pattern within the planning area to allow better management of public lands over the long term. Consolidating public land holdings facilitates access to public lands and reduces the number of access easements needed, as well as leads to a reduction in encroachment problems from adjacent property owners. These impacts are considered beneficial impacts.

Land use authorizations within the planning area comprise the issuance of leases and permits under Section 1732(b) of the Federal Land Policy and Management Act (FLPMA) for various activities, such as habitation, cultivation, and trade and manufacturing uses; airport leases; and leases and conveyances under the R&PP Act. Demand for leases and permits and for airport leases in the past has been low; it is not anticipated that demand will increase substantially during the life of the RMP. Demand for R&PP leases and conveyances may continue as opportunities grow to enhance recreation or meet the land needs of communities and nonprofit groups; R&PP leases and patents are considered as the need arises under each of the alternatives. Other resources and resource areas may prevent or limit the issuance of land use authorizations if mitigation cannot be negotiated.

With regard to Desert Land Entries, these will be considered on a case-by-case basis under alternatives A, C, and D based on soil characteristics, irrigation requirements, salinity issues, and the practibility of farming the lands as an economically feasible operating unit. Under Alternative B, no BLM-administered lands within the planning area are available for Desert Land Entry due to these factors, plus lack of water supplies, legal water rights, rugged topography, or the presence of sensitive resources. However, Desert Land Entries are unlikely under any of the alternatives, as several of these factors (e.g., unsuitable soils, lack of water supplies, etc.) prevent these from occurring. As such, no impacts due to Desert Land Entries are anticipated.

Temporary use permits (TUPs) are considered under all alternatives for areas to be used only for the duration of construction activities or for other short-term needs. These activities are not expected to result in any substantial changes to the lands and realty program, as the activities are temporary and must comply with applicable terms and conditions and any constraints.

Similar to land tenure adjustments, several resources, resource uses, and special designations could impact land use authorizations (e.g., Desert Land Entries, TUPs, R&PP leases, and patents). Prior to each proposal, an inventory is required to determine the presence of those resources, resource uses, or special designations, including cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, each of the special designations, and mineral resources. If any of these resources or special designations is present, then additional mitigation may be required or the proposal may be prohibited. Impact avoidance is accomplished through project redesign, project abandonment, or mitigation specific to that resource.

These actions can increase processing costs and timeframes, generally resulting in direct, long-term impacts to the lands and realty program. Because of the limited demand for land use authorizations, it is anticipated that impacts to this aspect of the lands and realty program will be minimal.

With the exception of mineral resource uses, withdrawals generally will be beneficial to resources, resource uses, and special designations because they prohibit land disposal and exclude some form of mineral development. Withdrawals segregate public lands and (or) federal minerals from operation of some or all of the public land laws, the mining laws, and (or) the mineral leasing laws. Operations under the mining laws are not discretionary actions with the Secretary of the Interior. Segregation is the only way to prohibit operations under the mining law—this is the underlying reason for withdrawals, classifications, and other segregations. Mineral material disposal and mineral leasing are discretionary actions of the Secretary of the Interior. No existing or proposed withdrawal segregates from disposal of mineral materials; only in rare instances does a withdrawal segregate against mineral leasing. In most instances, mining is prohibited on withdrawn lands. Withdrawals are intended and designed to preserve certain resource (including mineral) values or land uses in lieu of other mineral development. However, key components of the lands and realty program such as establishing or terminating withdrawals, are driven by other resource goals and objectives.

Reviews will be conducted for existing withdrawals, and it will be determined whether the withdrawals are still necessary. Only lands that will enhance multiple-use management and protection of nationally significant resource values and do not create a liability or burdensome management cost to the BLM will be accepted back into the public domain. New withdrawals will be considered as needs arise. New requests will be processed for protection of resources prior to lifting existing withdrawals, when those withdrawals are in the same location. Areas that contain withdrawal conflicts will be handled on a case-by-case basis. The BLM will proceed with the withdrawal petition for Cokeville Meadows as filed by the USFWS.

Alternative A

Under Alternative A, 1,364,497 acres of BLM surface area are retained, while 59,508 are identified for disposal (see Map 32). Restricted disposal parcels already are recognized as containing resources, resource uses, and special designations requiring appropriate mitigation into any disposal. Land disposal to private entities or local governments could result in some lands being available for future development; however, large-scale changes to land use are not expected to occur. BLM-administered lands transferred from federal ownership to local governments or private entities typically will be used for the same or similar purposes for which they are currently used due to the lack of any substantial development pressure. Urban expansion for housing, businesses, and some light industry are some of the most probable large-scale land use changes involving public land disposal actions, yet most communities in the planning area are surrounded by large acreages of private land with only small nearby areas of public land. Sufficient expected demand for orderly community growth does not exist to deplete the available private lands necessitating expansion into outlying public land. These land use changes will be coordinated with local governments in consideration of existing land use plans and policies (e.g., county comprehensive plans). Under Alternative A, existing withdrawals continue and no additional withdrawals will occur (Map 34). The current withdrawals are primarily from locatable mineral development, which protect oil shale, coal, and phosphate resources.

Legal access will be sought for areas of intense timber production and high-priority areas, including the Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and Bear River Divide, to successfully manage public land. Alternative A does not include establishments of new MAs; therefore, there are few adverse impacts to the Kemmerer Field Office's ability to execute land tenure adjustments (disposal) and land use authorizations (leases, permits, etc.).

Alternative B

No lands are identified for disposal under Alternative B and all 1,424,005 acres of the BLM surface area are identified for retention. Prohibiting disposals may affect the accomplishment of the lands and realty program goals. As such, the potential for land use changes due to future development are much lower than compared to Alternative A.

Alternative B will include the continuation of all existing withdrawals, with additional areas withdrawn (see Map 35). Withdrawals are primarily from operation of the mining laws for the protection of developed campgrounds, the federal section that includes the Bridger Antelope Trap, areas with special status plant and wildlife species, and the Cokeville Meadows NWR (see the Locatable Minerals section).

Legal access for timber and high-priority areas will be the same as for Alternative A. Alternative B includes the highest number of new MA establishments among the alternatives, resulting in the highest level of potential impacts to executing land use authorizations (no land disposal is proposed under Alternative B).

Alternative C

Potential impacts associated with land disposal under Alternative C are the same as those described under Alternative A (59,508 acres have been identified for disposal and 1,364,497 for retention) except that additional parcels are considered for disposal on a case-by-case basis (Map 32).

Procedures to lift the existing locatable mineral withdrawals within the planning area would be initiated under Alternative C, and no new withdrawals are added, except for the Cokeville Meadows NWR.

Establishment of MAs under Alternative C is similar to that under Alternative A, although the Raymond Mountain area no longer includes a designated ACEC. As such, there are no impacts to land tenure adjustments and land use authorizations due to MAs. Alternative C has the lowest level of potential impacts to executing land use authorizations.

Alternative D (Preferred Alternative)

Under Alternative D, potential impacts associated with land disposal are similar to those described under Alternative A, although lower in magnitude (35,823 acres are identified for disposal and 1,388,182 are identified for retention) (see Map 33).

Alternative D continues existing withdrawals and adds the same areas as Alternative B, except Alternative D does not withdraw areas with special status wildlife species (see Map 36). These withdrawals are for the protection of developed campgrounds, the federal section that includes the Bridger Antelope Trap, areas with special status plant species, and the Cokeville Meadows NWR (see the Locatable Minerals section). Therefore, withdrawals under Alternative D are second highest after Alternative B. Alternative D includes establishment of new MAs, although much fewer than are established under Alternative B. This creates the potential for some impacts to land tenure adjustments and land use authorizations.

4.6.1.3 Conclusion

The most substantial difference among the alternatives with regard to lands and realty is the amount of lands identified for disposal, which could result in future development of these lands. Alternatives A and C have the greatest potential for this, as they involve the highest amount of acreage for disposal, with Alternative B involving the least (no lands identified for disposal) and Alternative D located in between. However, it is not anticipated that any large-scale changes to these lands will occur, as development pressure near the planning area is low. Alternative B results in a large increase in lands withdrawn from locatable mineral development, followed by Alternative D with a reduced withdrawn amount. Alternative C removes all existing withdrawals and Alternative A results in no changes to existing withdrawals.

4.6.2 Renewable Energy

Actions occurring through implementing each alternative could affect renewable energy. Direct impacts to renewable energy include management actions permitting or prohibiting renewable energy development. Indirect beneficial impacts on renewable energy sources include management actions encouraging or facilitating renewable energy development. Indirect adverse impacts include management actions constraining renewable energy development.

In general, public utilities and private interests will develop renewable energy facilities based on market demand. Wind-energy development, the fastest growing sector of the renewable energy market, has had consistent growth of more than 20 percent over the last 10 years (researchandmarkets.com 2003). Wyoming public and private sector initiatives also have had increased renewable energy production (GAO 2004; Energy Atlas 2004). Solar and biomass energy development are not projected to impact available renewable energy resources in the planning area; therefore, wind energy is the primary focus of this analysis. Refer to maps 37 through 39 for renewable energy.

4.6.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Wind-energy development is expected to increase, relating directly to energy prices, national policy involving renewable energy, market demand, and other factors that encourage demand for alternative energy sources.
- Future wind-energy development proposals on BLM-administered lands within the planning area will be subject to the decisions and policy developed in the BLM's *Final Programmatic Environmental Impact Statement on Wind-Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005b). This Programmatic EIS proposes a wind-energy development program that implements policies and BMPs for ensuring that the impacts of wind-energy development on BLM lands are kept to a minimum.
- For analysis purposes, the national wind-energy capacity is projected to increase to 48,000 megawatts or more by 2025 (GAO 2004).
- The mapping of wind-energy potential areas is based on a large-scale nationwide mapping process likely to show a large margin of error if used for specific project location and prioritization of available renewable energy development sites.

4.6.2.2 Analysis of Alternatives

The types of impacts projected to occur to renewable energy because of the various alternatives are similar; however, the intensity of each impact is anticipated to vary by alternative. Therefore, management actions projected to impact renewable resources are described in general as impacts common to all alternatives and, more specifically, as impacts associated with individual alternatives.

Impacts Common to All Alternatives

Each alternative includes some restrictions to nonwind renewable energy projects. Managing for resources, such as soils, biological resources, cultural resources, visual resources, historic trails, and ROW and corridors, will most likely constrain renewable energy in the planning area. In general, management actions intended to protect these resource programs restrict wind-energy development by restricting the use of certain lands in the planning area for development and operation of wind-energy infrastructure. Indirect benefits for the local economy may occur from diversification of local energy sources.

Alternative A

Under Alternative A, the BLM makes no specific decision regarding areas suitable for renewable energy development. Instead, the BLM responds to specific proposals for renewable energy on a case-by-case basis. Market forces are the primary guides for renewable energy development opportunities.

Restrictions on surface disturbance to avoid or minimize soil erosion do not specifically restrict wind-energy development under Alternative A. Likewise, Alternative A does not specifically restrict wind-energy development to protect biological resources. For example, Alternative A does not address habitat fragmentation, prevent raptor perching on overhead powerlines, prohibit high-profile structures, or protect areas containing high resource values in terms of restrictions of wind-energy development. Alternative A does, however, provide protection for all historic, archeological, and cultural sites that are eligible for or listed on the NRHP; it does not prohibit establishment of ROWs and corridors and wind-energy projects. Moreover, Alternative A does not designate ROW and corridors in the planning area. The VRM classification under Alternative A does not identify protective buffers or establish specific viewshed protection around sensitive roads, NHTs, Bridger Antelope Trap, campgrounds, towns, and sites registered on the NRHP. Lastly, the Rock Creek/Tunp and Bear River Divide areas do not specifically prohibit high-profile structures, such as wind-energy facilities.

Alternative B

Under Alternative B, restrictions from other resources limit the areas suitable for wind-energy development to 12 percent of the BLM-administered surface (176,109 acres). Surface disturbance is managed to limit soil erosion by consolidating road networks and equipment placement; prohibiting surface disturbance in areas of sensitive or fragile soils, highly erosive soils, chemical and biological crusts; and limiting surface disturbance in areas where slopes are greater than 10 percent. To protect biological resources, Alternative B minimizes construction disturbance to the smallest acreage possible; restricts habitat fragmentation to no more than 3 percent of available special status species' habitats; buries all new low-voltage utility lines; requires installation of anti-perch devices on all new high-voltage utility lines; and prohibits new high-profile structures within 1 mile of occupied sagebrush obligate habitats. To protect cultural and visual resources, Alternative B prohibits the establishment of ROW and corridors and wind-energy projects within the boundaries of specific sites; designates and prohibits corridors to specific locations; prohibits wind-energy development in areas containing high resource values; establishes a 3-mile visual buffer around sensitive roads, NHTs, campgrounds, towns, and sites registered on the NRHP; preserves a 10-mile viewshed around specific sites; and establishes viewshed buffers around significant NHT segments in the planning area. Identifying other management for the Rock Creek/Tunp and Bear River Divide areas under Alternative B prohibits wind-energy facilities in these areas. Impacts to renewable resources are greater under Alternative B than Alternative A and all other alternatives.

Alternative C

Under Alternative C, 97 percent of BLM-administered surface lands (1,376,607 acres) are identified as suitable for wind-energy development. Restrictions to protect Raymond Mountain WSA and the Bridger Antelope Trap prohibit wind-energy development. In general, management actions to protect soils, biological, cultural, and visual resources; NHTs; and ROWs and corridors under Alternative C are the same as under Alternative A. The VRM classification under Alternative C does not identify protective buffers or establish specific viewshed protection around sensitive roads, NHTs, Bridger Antelope Trap, campgrounds, towns, and sites registered on the NRHP. Lastly, the Rock Creek/Tunp and Bear River Divide areas do not specifically prohibit high-profile structures, such as wind-energy facilities. Impacts to wind-energy development under Alternative C are anticipated to be similar to those identified as under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, 55 percent of the BLM-administered surface (780,714) is identified as suitable for wind-energy development. Restrictions from other resources impacting wind-energy development include surface disturbance management designed to limit soil erosion by consolidating road networks and equipment placement and avoiding surface disturbance in areas of sensitive or fragile soils, highly erosive soils, chemical and biological crusts, and in areas where slopes are greater than 20 percent. To protect biological resources, Alternative D minimizes construction disturbance to the smallest acreage possible, avoids habitat fragmentation in available special status species' habitats unless mitigation is initiated, buries all new utility lines or requires installation of anti-perch devices on all new utility lines within sagebrush and (or) semiarid shrub-dominated habitats to avoid impacts, and avoids new high-profile structures within 1 mile of occupied sagebrush obligate habitats, unless anti-perch devices are installed. To protect cultural and visual resources, Alternative D designates and restricts corridors to specific locations. A 1-mile visual corridor is established for specific areas and a 3-mile viewshed is established around specific cultural sites under Alternative D. The viewshed of specific NHT segments is larger under Alternative D than compared to Alternative A. Under Alternative D, no new wind-energy facilities are authorized in the Rock Creek/Tunp and Bear River Divide areas identified for other management. All of the above restrictions are anticipated to limit the development of wind energy in the planning area more than alternatives A and C, but not to the extent of Alternative B.

4.6.2.3 Conclusion

Restrictions developed to protect other resource values under alternatives B and D are the most constraining to wind-energy development, while alternatives A and C are the least constraining. However, because areas suitable for wind-energy development exceed current demand, it is expected that market demand, rather than BLM policy, will be the primary constraint of wind-energy development.

4.6.3 Rights-of-Way and Corridors

The purpose of the ROWs and corridors program is to accommodate the needs of the Kemmerer Field Office and respond to changing needs for ROWs and corridors in accordance with resources and activities that require them. This section identifies potential direct and indirect impacts to ROWs and designated corridors within the planning area. Refer to maps 40 and 41 for ROWs and corridors.

Impacts to ROWs and corridors include restrictions on accommodating new facilities. The ROWs and corridors program results in beneficial impacts to the programs it serves (generally oil and gas and utilities).

Direct impacts to ROWs include restrictions on accommodating new facilities, possible restrictions on ROW uses and, to some degree, changes in permitting timeframes. Indirect impacts may include restrictions on ROWs from resource values, special designations (e.g., ACECs), economics, and recreational areas.

4.6.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- ROW increase in conjunction with expanded oil and gas, utility, and communication development.
- Corridors and communication site windows, also called ROW use areas, are designated as the preferred future locations for ROW and can be designated only in an RMP or plan amendment.
- ROW for smaller distribution facilities for minerals development and transportation, power and telephone services, and access roads are expected to remain at current levels, but could fluctuate with the degree of development.

4.6.3.2 Analysis of Alternatives

The types of impacts projected to occur because of the various alternatives are similar; however, the intensity of each impact is anticipated to vary by alternative. Management actions anticipated to impact ROW and corridors are described in general as impacts common to all alternatives and, more specifically, as impacts associated with individual alternatives.

Impacts Common to All Alternatives

The differences between the four alternatives involves the level of development that will result from other land uses and development (primarily oil and gas), as well as the levels of restrictions (avoidance and exclusion areas) on the locations of ROWs. All alternatives include restrictions on surface-disturbing land uses, including ROW. Several areas are considered conditional avoidance or exclusion areas because they can be determined only through site-specific surveys. These surveys are performed prior to surface-disturbing activities, and include greater sage-grouse nesting, pygmy rabbit, and black-footed ferret habitats, and affect the placement of ROWs and communication sites under all alternatives.

Corridors have a beneficial effect on oil and gas development and major utility projects. Major transporting pipelines benefit from placement in a corridor where land use conflicts have been eliminated or reduced. Designated corridors are intended to reduce resource and land use conflicts as much as possible.

ROWs for telephone and fiber optics, pipelines (oil and gas and water), roads, and powerlines are linear disturbances and, due to the nature of the planning area land pattern, it will be difficult (if not impossible) to avoid BLM-administered lands by placing a project entirely on private lands. Disturbance associated with telephone and fiber optics and pipelines is limited to the short-term as the lands are reclaimed following construction. Each alternative includes 1,371 acres of short-term disturbance due to telephone and fiber optics, 6,000 acres of short-term disturbance from large-capacity (10- to 36-inch) pipelines, and 60 acres of short-term disturbance from water pipelines. Each alternative includes 1,740 acres of short-term and 1,732 acres of long-term disturbance from powerlines. With regard to communication sites, each alternative includes 28 acres of short-term disturbance and 22 acres of long-term disturbance. Other facilities include 365 acres of short-term and long-term disturbance.

The impacts of corridors are the same as those created by individual ROWs; however, the impacts are intensified both by confinement of many ROWs to a small area and the greater importance of impacts resulting from construction of major facilities.

Alternative A

ROW exclusion areas (areas unavailable for location of any ROWs within BLM-administered surface lands) would not be established under Alternative A. Alternative A does not preclude the placement of ROW within archeological and cultural sites and does not designate ROW corridors. This alternative also does not include specific decisions regarding location of communication sites. As such, placement of communication sites is limited only by constraints presented by avoidance and exclusion areas for other resources, including renewable energy projects. All ROW corridors are considered on a case-by-case basis.

Roads developed under Alternative A are primarily due to oil and gas development. Surface disturbance from roads includes 2,256 acres in the short term and 1,706 acres in the long term.

No specific decision regarding renewable energy, including wind-energy, projects exists under Alternative A; however, surface disturbance from wind-energy development under Alternative A includes 134,400 acres in the short term and in the long term (refer to Appendix M). Due to the low level of current interest in renewable energy projects, it is unlikely these actions would result in impacts.

Alternative B

Under Alternative B, there will be 452,208 acres of ROW exclusion areas; ROW corridors total 81,642 acres. Alternative B precludes the designation of new ROW corridors through sites listed on the NRHP, and corridors are not designated where they conflict with NHT management objectives (see Map 40). ROW corridors are limited within the BLM-administered surface. Preferred corridors are ¼-mile wide and include the following:

- New intrastate pipeline authorization linking the Jonah Gas/Pinedale Anticline Fields to existing plant sites in the planning area.
- New interstate pipeline authorization following the existing California and Pacific Coast States pipelines.
- Gathering pipelines for individual wells (6 inches or less in diameter) are to follow access roads associated with well pads.
- High-voltage powerline corridors are established north of and parallel to I-80, and along State Highway 89 from the junction of I-80 and the Wyoming state line.
- Fiber optic and low-voltage powerline corridors are located along currently established road systems (e.g., interstate or state highways and paved county roads) (see Map 40).

The federal lands within the following archeological and cultural sites within the planning area are closed to ROW placement: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and Bear River Divide trail landmark. These management actions result in an adverse impact to the ROW and corridors program compared to Alternative A, which has fewer restrictions.

Alternative B includes the least amount of road development of the four alternatives, comprising 2,112 acres of short-term disturbance and 1,562 acres of long-term disturbance. In addition, Alternative B prohibits wind-energy development in areas with high resource values (see the Renewable Energy section). Disturbance from wind-energy development under Alternative B includes 40,320 acres in the short term and in the long term. However, due to the low level of current interest in renewable energy projects, it is unlikely that these restrictions would result in impacts. These management actions result in adverse impacts to the ROW and corridor program compared to Alternative A.

Alternative B consolidates communication sites to the following areas: Quealy Peak, Medicine Butte, Hickey Mountain, and the BLM Wareyard. Alternative B presents the highest level of constraints to the placement of communications sites, resulting in an adverse impact to the ROW and corridors program.

Alternative B allows the lowest amount of surface disturbance of the four alternatives. For this reason, Alternative B is anticipated to have the greatest adverse impact to renewable energy due to having the most constraints to development of this resource.

Alternative C

Alternative C designates utility corridors based on historic placement on a case-by-case basis, constraining the siting of utility corridors more than under Alternative A, but less than under alternatives B and D. Surface disturbance under Alternative C is the same as described under Alternative A; however, Alternative C does not allow for wind-energy development within the Raymond Mountain WSA and the boundaries of the Bridger Antelope Trap.

No ROW exclusion areas will be established under Alternative C. Indirect impacts to ROW and corridors under Alternative C could include economic impacts from the preference for locating major ROWs within designated corridors (versus more direct routes).

Communication sites are considered on a case-by-case basis under Alternative C. As such, limitations to the placement of communications sites are similar to that under Alternative A (i.e., constraints limited to avoidance and exclusion areas) and result in similar adverse impacts, but less adverse impacts compared to alternatives B and D. Potential impacts from renewable energy projects (other than wind energy) are the same as under Alternative B (i.e., no impacts are anticipated).

Alternative D (Preferred Alternative)

Designation of ROW corridors under Alternative D is similar, but less restricting as described under Alternative B. Under Alternative D, utility corridors are designated based on the type of use (e.g., powerlines, pipelines, and fiber-optic lines) and can be up to be 2-miles wide based on resource values (see Map 41). Sitings of fiber-optic and high-voltage and low-voltage powerline corridors are the same as under Alternative B, but variances are allowed based on application where conflicts with other resources are minimal or can be mitigated through resource-specific stipulations. ROW exclusion areas total 109 acres and ROW corridors are allowed within 539,968 acres of BLM-administered surface.

Surface disturbance associated with ROWs and corridors under Alternative D is the same as described under Alternative A, with the exception of wind-energy development. Alternative D identifies five preferred areas for wind-energy development (refer to Chapter 2). Surface disturbance from wind-energy development under Alternative D includes 67,200 acres in the short term and in the long term. These management actions result in an adverse impact compared to Alternative A.

Indirect impacts to ROW and corridors under Alternative D could include economic impacts from the preference for locating major ROWs within designated corridors (versus more direct routes). Under Alternative D, 23 designated areas (refer to Chapter 2) are considered for communications sites. As such, Alternative D presents fewer constraints compared to Alternative B, but is more restrictive compared to alternatives A and C. Potential impacts from renewable energy projects (other than wind energy) are the same as under Alternative B (i.e., no impacts anticipated).

4.6.3.3 Conclusion

The amount of ROW development is essentially the same across the four alternatives for most types of ROWs, with the exception of roads under Alternative B, which are somewhat lower in number than under the other alternatives. Alternatives A and C introduce the lowest level of constraints to the placement of new ROWs and communications sites. Alternative B presents the highest level of constraints to the placement of new ROWs and communications sites, while Alternative D is similar to Alternative B, although it presents fewer constraints.

4.6.4 Livestock Grazing Management

Allowable uses and management actions that limit, reduce, or prohibit livestock grazing or reduce animal unit months (AUMs) in the planning area are considered adverse impacts to livestock resources. Deterioration in rangeland health also is considered adverse to livestock grazing success. Restrictions on livestock grazing or AUMs to protect resource values are considered adverse impacts. Conversely, beneficial impacts to livestock grazing include those allowable uses or actions that improve rangeland health, increase AUMs, or decrease restrictions and costs to livestock grazing operations.

Direct impacts to livestock grazing from RMP alternatives are anticipated from actions that change AUM allocations or in any way restrict, prohibit, or allow additional livestock grazing on an area. For example, the BLM policy requirement for deferring two growing seasons of grazing following prescribed fire and wildland fire is considered a direct adverse impact to livestock grazing because it prohibits grazing. Indirect impacts to livestock grazing are anticipated from actions that change rangeland health and productivity or that change livestock grazing management on BLM-administered public lands within the planning area (e.g., change in grazing seasons). For example, to avoid direct AUM losses from herd reductions under the deferment of grazing following fire, the lessee may lease additional pasture, feed

livestock for longer periods, or install additional fencing, all at additional economic costs. However, deferment also enhances vegetative recovery, which, over time, benefits livestock grazing through improved forage conditions. Another example of indirect impacts is the introduction of INNS by surface-disturbing activities that decrease forage availability, along with range productivity.

For the purpose of this analysis, short-term impacts to livestock grazing include activities that change the AUM allocation or rangeland health within 5 years of when the activity occurs. Long-term impacts are those remaining or occurring after 5 years. For example, the two-season grazing deferment following fire would be a short-term impact; a long-term beneficial impact to livestock grazing also may occur if the result is an increase in the quality or quantity of forage.

4.6.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- No net change in AUMs is expected in the planning area from implementing land-disposal and land-acquisition actions.
- All surface-use proposals are to be fully implemented during the planning period.
- Surface disturbances reduce the amount of forage (see Appendix M) available to livestock and wildlife and can be short- and long-term.
- Surface disturbances increase the likelihood for the introduction and spread of INNS, which degrade rangeland health and impact wildlife and livestock forage quality and quantity.
- To varying degrees, areas of concentrated wildlife and livestock use exist in most allotments (i.e., riparian and wetland areas, salting areas, fence corridors, etc.). Range improvements and managed livestock grazing methods disperse livestock and minimize livestock concentrations.
- Placement of salt and mineral supplements is one tool to reduce livestock concentration in riparian areas. Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health. Approximately 10 percent of the public acreage in the planning area is evaluated annually.
- Managing wildlife and special status plants and wildlife can affect livestock grazing allocations.
- Managing for other resource uses can affect livestock grazing allocations and management.
- Prescribed burning is anticipated to be a higher priority over the life of the plan than it has been in the past.
- The BLM works with grazing lessees and permittees to identify and accomplish livestock grazing objectives. Over the last 50 years, rangeland health has improved across the planning area due to improved grazing management practices.

4.6.4.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting livestock grazing include all surface-disturbing activities, restrictions protecting other resources, fire management, INNS control, and proactive livestock grazing management practices. These allowable uses and management actions may result in short- or long-term changes in AUM allocations and rangeland health. Although multiple factors influence AUM allocations and rangeland health, key planning issues identified during the scoping process identified surface-disturbing activities, restrictions protecting other resources, fire management, and INNS as the primary factors to be addressed by alternatives and analyzed in this section. Surface-disturbing activities and associated acreage are identified in Appendix M as part of the BLM's RFDs.

Restrictions protecting other resources relate to inherit conflicts between competing resources and uses of the public lands, and the challenges of managing for multiple uses.

Impacts to livestock grazing management are described and organized according to (1) changes in AUM allocations, (2) changes in rangeland health, and (3) management actions. The description of management actions includes actions restricting livestock grazing, as well as actions that benefit livestock grazing. Refer to Map 42 for livestock grazing allotment management categories, unallocated parcels, and livestock trails in the planning area.

Impacts Common to All Alternatives

The types of impacts projected to occur to livestock grazing management because of each alternative are similar and include changes in AUM allocations and rangeland health. The factors causing these impacts primarily include surface-disturbing activities, restrictions protecting resource values, fire and fuels management, INNS, and proactive management actions. Changes in AUM allocations and rangeland health, and the associated causative factors of these changes, are described below as impacts common to all alternatives. How the intensity of these impacts varies by alternative is described under individual alternatives.

Livestock grazing continues to occur within the majority of the planning area under all alternatives. In addition, current allotment categories (M, C, and I) and current livestock trails are maintained under all alternatives. The Standards *for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) will be applied, regardless of alternative. Vegetation treatment projects designed to benefit rangeland health also are anticipated to occur under all alternatives.

Over the life of the plan, it is estimated that to achieve or maintain the desired future condition (DFC) for rangelands, mechanical and chemical treatment and prescribed fire need to occur in the planning area. Mechanical treatment of rangeland includes the mowing of sagebrush and the mowing or shredding of limber pine and juniper. This treatment is done to increase forage production and improve forage quality, as well as to facilitate grazing management activities (e.g., moving livestock between pastures). Chemical treatments are implemented to thin stands of sagebrush for improved forage production and to facilitate grazing management objectives, as well as to supplement INNS control activities in specific areas of the planning area. Prescribed burns are used to attain DFC, such as maintaining rangeland in a specific seral condition and to achieve wildlife, livestock, and watershed management objectives.

The analysis of alternatives is based on existing conditions and considers that over the last 40 to 50 years, an improvement in range conditions has occurred (see Livestock Grazing in Chapter 3). Such improvement is due largely to improved grazing management practices, development of range improvement projects (e.g., fences and water developments), and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range conditions generally are anticipated to continue under all alternatives based on vegetation treatment, range-improvement projects, and development of guidelines for areas determined as not meeting rangeland health standards. INNS are one factor that may adversely impact the improving trend.

Under all alternatives, it is anticipated that throughout the planning area, the development and maintenance of springs impact approximately 125 acres, well installation 30 acres, water pipeline installation 150 acres, reservoir maintenance 29 acres, and fencing approximately 600 acres (Appendix M). Adverse impacts associated with these improvement projects generally are considered short-term, as vegetation typically is reclaimed within two to three growing seasons. While adverse impacts associated with the construction of these facilities are short-term, the long-term impacts of these actions are designed to be beneficial. For example, new fences and new water developments are expected to change livestock grazing patterns and distribution within the allotment, resulting in long-term beneficial impacts. Moreover, congregation of livestock and wildlife around water sources and trailing patterns also are

expected to improve because of constructing these facilities. Overall, the long-term impacts from these facilities are anticipated to be a beneficial improvement to rangeland health. Rangeland improvement projects allow livestock managers and permittees/lessees to better implement grazing management practices and manage the distribution and movement of livestock within allotments. BLM fencing standards, whether applied to new fencing or used to modify existing fencing to eliminate conflicts with wildlife may affect livestock grazing management. Management actions developed for wildlife travel and migration corridors, as well as active raptor nests, also may have an impact to livestock management options.

Changes in AUM Allocation

Changes in AUM allocations within the planning area may occur for several reasons, but are expected to be limited to specific allotments and to be relatively small changes compared to the total AUM allocations for the planning area. In many cases, a change in AUM allocations reflects a change in management of livestock within an allotment, or a change in management of another resource that affects livestock. For example, if grazing management and (or) range improvement projects have increased the overall productivity of an allotment, then it may be appropriate to increase the number of AUMs permitted under the grazing lease or permit for that allotment. Conversely, if forage productivity changes due to surface disturbances, fire, wildlife (e.g., elk, prairie dogs) use, INNS increases, and (or) if monitoring indicates a downward trend in rangeland health, the number of AUMs permitted in an allotment may decrease. The number of AUMs permitted in an allotment also may decrease if it is discovered that the number of AUMs originally permitted over-allocated the forage resource. This may occur in allotments where features, such as rock outcrops, steep slopes, rock or bare ground, or other factors limiting forage utilization by livestock, were not adequately accounted for when AUMs were originally allocated.

Any potential changes to AUM allocations are based on the amount of available forage in an allotment as determined through monitoring or other means (43 CFR 4110.3-2[b]). The number of AUMs permitted in an allotment may be increased, cancelled, temporarily suspended, indefinitely suspended, or authorized not to be used (temporary nonuse). Temporary non-use status is reevaluated on an annual basis. Changes in AUM allocations have more impact on individual allotments and lessees than they do to AUM allocations in the entire planning area.

Management actions potentially affecting the availability of AUMs within the planning area include land disposal, development, and associated surface disturbance, management of suspended AUMs, availability of AUMs on acquired lands, designation of forage reserve, closure of areas to livestock grazing to protect resource values, and management actions related to drought and wildland fire. Any changes in AUM allocations affect revenues generated by grazing fees, as well as individual lessees and their annual profit margins.

Land disposal could occur throughout the planning area; however, the most disposal acreage is identified in Uinta County in the southern portion of the planning area. Additional lands are identified for consideration for disposal in the center of the planning area in Lincoln County. The least acreage identified for potential disposal is in northern Lincoln County. All lands identified for consideration for disposal are isolated and generally surrounded by private land. The majority of land disposed likely will continue to be grazed under different (e.g., private) ownership; however, grazing fees will no longer be collected by the BLM for these areas. Frequently, land disposal is tied to land exchanges, resulting in no net change in AUMs, or only a slight increase or decrease in AUMs. Land exchanges between the BLM and private entities typically result in the BLM acquiring fewer acres of higher overall quality than the acreage disposed, resulting in a reduction in the number of acres managed by the BLM. However, the impact on overall AUMs in the planning area cannot be predicted due to the differences in forage production among sites. In addition, the Kemmerer Field Office targets lands for acquisition that help to consolidate public lands into larger blocks, making management more efficient. Therefore, land disposal

and acquisition may or may not occur in the same allotment. Consequently, land exchange frequently has a more dramatic impact on specific allotments than on the total number of AUMs in the planning area.

Development and associated surface disturbance on public lands can result in the direct removal of forage available to livestock. As shown in Table 4-1 and Appendix M, projected surface disturbance is anticipated to result in short- and long-term removal of forage. Rangeland health and forage production can be directly and indirectly affected by surface disturbance through the loss of forage, spread of INNS, and soil erosion. The majority of direct and indirect impacts of surface disturbance are projected for wind-energy development, road construction, mineral development, and development and maintenance of associated infrastructure such as pipeline or transmission ROWs.

When compared to other minerals, oil and gas development is anticipated to cause the most long-term surface disturbance and, hence, the most adverse impact on livestock grazing in the planning area. Fifty-six allotments administered by the Kemmerer Field Office are in areas considered as having a high-to-moderate potential for oil and gas development. All or portions of these 56 allotments are, therefore, likely to be affected by oil and gas development under one or more of the alternatives. Both short-term and long-term impacts to AUM allocations may occur; the long-term impacts are of greater concern to livestock grazing. The degree of impact depends on the rate of development, production success, and how quickly disturbed areas are reclaimed. For example, it is expected that disturbed areas associated with nonproducing wells will be reclaimed quickly and AUMs taken out of production by vegetation removal would be restored in the short term. On the other hand, for producing wells, it will likely take more than 5 years (long term) before disturbed areas are reclaimed and made available for grazing use. Reducing AUMs is local in nature since development is unlikely to occur simultaneously across the entire area (e.g., all wells developed at the same time). The impact on AUM allocations could be substantial for individual allotments, but the overall impact of disturbance from oil and gas development on AUMs in the planning area is expected to be negligible.

In some instances, oil and gas development can benefit livestock by increasing the number of water wells available for livestock watering, thereby improving livestock distribution in an allotment. In other words, wells developed through oil and gas development can, in some instances, be converted to water wells for use by livestock and wildlife.

Subdividing base property for recreation or housing developments is a recent activity that could potentially impact the BLM's ability to effectively manage adjacent public lands for grazing. Subdividing would primarily impact individual grazing allotments and could result in breaking allotments into smaller units or in canceling the grazing lease/permit entirely. In addition to the addition of structures, subdivisions generally result in more vegetation removal and surface disturbance for roads, fences, powerlines, and other facilities—all of which can fragment habitat and increase the opportunity for spread of INNS. The long-term impact could result in loss of AUMs and degradation of rangeland health.

Long-term disturbances due to development on lands not administered by the BLM are expected to be greater than projected long-term disturbances on BLM-administered lands for all alternatives (Appendix M).

There is potential to increase available AUMs with the management action to close all unauthorized roads and two-tracks and those not needed for management purposes, and reclaim them back to their native condition.

Changes in Rangeland Health

Several natural and manmade factors can adversely affect rangeland health and productivity within the planning area. Natural factors include climatic cycles, such as drought; overpopulation of wild ungulates; and catastrophic events (e.g., flashfloods or wildland fires). Manmade factors within the planning area generally include improper grazing, prescribed fire, surface disturbances, and INNS.

Breaking up soil crust that restricts infiltration and inhibits seedling establishment and increasing cover and vigor of native vegetation are two ways of improving forage conditions for livestock grazing. Increased cover and vigor of native vegetation could minimize soil erosion. The health of riparian and wetland areas also can be affected by grazing management and implementing range improvement projects. Of note is that wildlife can cause similar types of adverse impacts to an allotment as those described for livestock.

All alternatives strive to prevent improper grazing through implementing the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management* (BLM 1998a). Therefore, it is anticipated that the degree and extent of grazing-related impacts on public lands over the long term should continue the current trend of improvement.

Fire can have both beneficial and adverse impacts on livestock grazing management. In the short term, fire burns forage that livestock depend on and can damage facilities such as fences. This damage can have a substantial adverse economic impact on grazing operations by requiring leasing of additional pasture, feeding livestock for longer periods, building or repairing fences, and reducing herd size. BLM policy requires deferment of livestock grazing following prescribed fire or wildland fire for a minimum of two growing seasons; however, deferment depends on the severity of the fire and the types of restrictions placed on grazing use on public land. In the long term, fire may improve the quality and quantity of forage, thereby improving flexibility in managing livestock.

Both prescribed and wildland fires can increase the extent of INNS found on an allotment. The extent that fire degrades rangeland health through propagation of INNS typically depends on the proximity to a source of INNS seed, the type of vegetation community burned, and fire severity. For example, within the planning area, fires in mountain big sagebrush communities appear to be more resistant to cheatgrass infestation following a fire than other vegetation communities (e.g., mountain mahogany). Fire management using prescribed fire can benefit livestock grazing by improving the quality, quantity, and availability of forage for livestock. Prescribed fire also can help meet specific management objectives, such as improving distribution of livestock or removing dense stands of brush. However, use of prescribed fire is less likely in areas with mineral and energy development. Fire-suppression activities can limit the loss of livestock, short-term loss of forage, and in some cases, the long-term damage to vegetation caused by fire, but it also can increase the likelihood of INNS spread into an allotment. The long-term impact of repeated fire suppression is the buildup of hazardous fuels and the increased risk of severe or catastrophic wildland fires.

One of the primary indirect impacts of surface disturbance affecting rangeland health and productivity is the spread of INNS. INNS displace native vegetation and, because they typically are unpalatable to livestock and wildlife, remain ungrazed. This places more strain on remaining native vegetation to support grazers, giving INNS an additional advantage over native vegetation in their competition for water, nutrients, and light. Invasion of some weed species (e.g., cheatgrass) can alter the fire regime of an area, causing long-term adverse impacts to livestock grazing. Surface-disturbing activities typically include mechanized or mechanical disturbance, such as construction of well pads, roads, pits, reservoirs, pipelines, and powerlines; mining; and vegetation treatments. Although typically reclaimed, these activities can increase INNS infestations and soil erosion within allotments in both the short and long term. Land reclaimed from oil and gas or other activities generally has a short-term beneficial impact on rangeland productivity due to the reseeding and subsequent growth of native grasses.

Dust caused primarily by roads, is another type of indirect impact. Dust can affect rangeland health and productivity and decrease the palatability of forage for livestock and wildlife.

In areas accessible to livestock, vegetation treatments, such as forest clear-cutting and thinning, can indirectly benefit livestock grazing by allowing more light to reach understory vegetation, thereby

increasing herbaceous growth and temporarily increasing the amount of available forage to livestock. However, the authorized use of the area is unlikely to change.

Management Actions

Management actions designed to protect resource values (e.g., special status species) may adversely impact livestock grazing management by restricting grazing in certain areas. Conversely, some management actions are designed to benefit livestock grazing management (see Chapter 2, description of alternatives). Management actions of both types are described in this section. Impacts resulting from these actions anticipated to vary by alternative are described under individual alternatives.

Managing cultural resources can restrict the location and design of rangeland improvement projects and, consequently, grazing systems. For example, avoidance of cultural resource sites that are eligible for or listed on the NRHP, limitations on activities located adjacent to historic trails, and activities impacting the historic landscape, may limit the BLM's ability to construct rangeland improvement projects in an allotment aimed at better management of livestock. In addition, cultural resource management can delay construction of range-improvement projects by requiring additional surveys and designing changes in projects to avoid important cultural sites.

Management for plant and wildlife species designated as threatened or endangered under the ESA or designated as sensitive species by the BLM can affect livestock grazing in allotments where these special status species occur. Specifically, restrictions on the type, location, or period that grazing or range improvement activities are allowed could limit livestock management options in allotments where sensitive species occur. For example, surface use restrictions could affect development or placement of range improvement projects and potentially affect the ability of the BLM or a grazing operator's ability to implement grazing management practices. In addition, special status species management can increase costs to livestock grazing operations by requiring additional surveys and design changes to projects. Water developments for livestock located on BLM-administered land in the Colorado River Basin (part of the planning area) consider potential adverse consequences of water depletion on threatened and endangered fish species in the Colorado River Basin. In sagebrush habitats, where greater sage-grouse or other sagebrush-dependent species may occur, the placement of range improvement projects, season of grazing use, level of grazing use, use of prescribed fire, adjustments in grazing preference, and seasonal restrictions all may be affected. Conversely, a BLM focus on avoiding habitat fragmentation in special status species habitats would benefit rangeland health and therefore livestock grazing. Where management actions are proposed for prairie dogs, livestock grazing may be affected. Although the white-tailed prairie dog is not listed as threatened or endangered, it is a BLM-sensitive species and an important food source to raptors. It also provides habitats for the burrowing owl and the black-footed ferret.

Special status plant species are known to or may occur in the planning area (see Special Status Species – Plants). Special considerations for the management of these plant species as they are discovered, or if critical habitat is designated, also could impact livestock grazing. To prevent trampling by livestock, water developments and placement of salt, mineral, or forage supplements for livestock are not allowed in areas inhabited by special status species or other sensitive areas under all alternatives; however, the size of the buffers vary by alternative. Any sort of buffer may restrict the placing and (or) timing of constructing range-improvement projects and, therefore, adversely impact livestock grazing by limiting management flexibility.

Resource management actions pertaining to fish and wildlife management, special status species management, mineral development, lands and realty management, OHV use, recreation use, MA management, INNS management, fire management, soil management, and vegetation management could affect livestock grazing both adversely and beneficially. Actions anticipated to substantively impact livestock grazing are identified by alternative under the headings "Changes in AUM Allocations" and "Changes in Rangeland Health," below.

Alternative A

Changes in AUM Allocations

Other than one developed campground and a few small parcels, which are not permitted or leased for livestock grazing, the planning area is open to livestock grazing and management is organized under 224 grazing allotments. Suspended AUMs are not available for livestock use under Alternative A.

No forage reserve is designated for the Christy Canyon allotment under Alternative A. Livestock operators in the Lost Creek/Ryan Creek allotments are held to the current permitted use and the 827 AUMs associated with the private land acquisition are allocated for wildlife use. Livestock grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed under Alternative A, but only as a management tool for enhancement of wildlife values and only on a temporary, nonrenewable basis.

Currently, approximately 157,249 AUMs are being actively utilized in the planning area. Over the life of the plan, authorized use reductions could occur if monitoring indicates a need for change (43 CFR 4110.3-2), which would adversely impact livestock grazing management. Approximately 15,556 AUMs are anticipated to be lost over the life of the plan primarily due to the 144,673 acres of projected long-term surface disturbance under Alternative A (Table 4-1). This is the highest of the alternatives for long-term surface disturbance and could change the way AUMs are allocated, having an economic impact on ranching interests.

Changes in Rangeland Health

The current grazing systems and range improvements in the planning area are designed to achieve management objectives for livestock grazing. The focus of management is to improve Category I allotments and maintain category M and C allotments. Approximately 10 percent of public land acreage in the planning area is evaluated annually to determine whether it meets standards for healthy rangelands. The evaluation includes an assessment of soil erosion condition and stability. Indirect adverse impacts to rangeland health under Alternative A are anticipated from the spread of INNS and an increase in soil erosion, which is a typical result of increased surface disturbance.

The locations of livestock salt and mineral supplements generally are determined on a site-specific basis; however, they are not allowed in areas of special status plant species under Alternative A. In addition, range improvement projects are not allowed on special status species populations under Alternative A, adversely impacting livestock grazing management on small areas.

Alternative B

Changes in AUM Allocations

Other than one developed campground and a few small parcels that are not permitted or leased for livestock grazing, the planning area is open to livestock grazing, and BLM management remains organized under 224 grazing allotments. Suspended AUMs will not be activated for livestock use under Alternative B, similar to Alternative A. Under Alternative B, the Christy Canyon allotment is designated as a forage reserve (up to 1,248 AUMs) managed by priority criteria identified in Appendix B. Designating a forage reserve could have direct beneficial impacts on livestock grazing management if the BLM allows grazing of the forage reserve during times of drought. Livestock operators in the Lost Creek/Ryan Creek allotments comply with the same restrictions identified for Alternative A. Ryan Creek/Lost Creek (Lost Creek Coordinated RMP Area), sensitive cultural sites, oil- and gas-production facilities, and the Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing under Alternative B, thereby reducing available AUMs and adversely impacting livestock grazing management more than Alternative A in these areas. However, over the life of the plan, approximately 5,128 AUMs are anticipated to be lost to long-term surface disturbance under Alternative B, which is the least of all alternatives.

Changes in Rangeland Health

Rather than improving range conditions on Category I allotments and maintaining conditions on category M and C allotments, as described under Alternative A, Alternative B implements grazing systems and range improvements to enhance watershed, riparian, and wildlife values, while reducing livestock conflicts with other resources. Even though this alternative includes the least amount of new surface disturbance and development, ranching interests may be affected economically by the shift in emphasis from livestock grazing to wildlife. Less indirect adverse impacts in rangeland health under Alternative B are anticipated from the spread of INNS because projected surface disturbance is less than for all other alternatives.

Restrictions designed to protect habitat health under Alternative B, may also affect range improvement project development. The locations of livestock salt and mineral supplements are prohibited within ½ mile of special status plant species, water sources, riparian areas, NHTs, and aspen stands. In addition, range improvement projects are not allowed within ½ mile of special status plant species populations unless they benefit the plant species, or in areas identified as having poor topsoil (i. e., badlands, saline bottomlands, sodic, high pH, or calcarious). Surface disturbance prohibitions include within ¼ mile of or within 100-year floodplains, wetlands, riparian areas or perennial streams; and prohibitions in areas supporting cushion plant communities and in designated MAs.

Recreation management changes that may have beneficial effects to livestock management include those proposed for SRMAs at Pine Creek Canyon and Raymond Mountain. Benefits to rangeland health may occur by proposed restrictions on activities that can degrade soils and disrupt livestock activities such as camping and OHV and snow machine use. Beneficial impacts for rangeland health under the proposed Dempsey Ridge SRMA, and the Rock Creek/Tunp and Bear River Divide MAs include restrictions on OHV use and new mineral sales, leasing, exploration and development; limiting ROW actions to existing corridors; and no new road developments. The general management action to designate no areas within the planning area open to OHV use under Alternative B also protects rangelands from damage.

Adverse effects to livestock management in the area may occur from additional salt lick and mineral supplement restrictions to those listed above within the Dempsey Ridge SRMA and for the two proposed MAs that include ½ mile from sensitive wildlife areas and specified cultural sites. Proposed changes in travel management under Alternative B to limit motor vehicles to crowned and ditched roads may adversely affect livestock managers' access to rangeland improvements and livestock. Also, no designations of areas open to OHV use under Alternative B may limit managers from accessing/moving livestock off roads. Stricter VRM buffers for cultural resources, campgrounds, and towns may adversely affect placement of range improvement developments. These restrictions are anticipated to reduce flexibility in management and, therefore, adversely impact livestock grazing operations more than for Alternative A.

Alternative C

Changes in AUM Allocations

Under Alternative C, the entire planning area is open to livestock grazing and management remains organized under 224 grazing allotments. In addition, livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing. Suspended AUMs can be activated for livestock use under Alternative C, thereby benefiting livestock grazing operations more than Alternative A.

Forage reserve allotments are not designated under Alternative C. The 827 AUMs associated with the Lost Creek/Ryan Creek allotments are available for both livestock and wildlife use, thereby increasing available AUMs for livestock compared to Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed under Alternative C without the requirement for enhancing wildlife values as required under Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is anticipated to provide more forage, and therefore, benefit livestock grazing management

more in the short term and long term compared to Alternative A. Over the life of the plan, approximately 15,534 AUMs are anticipated to be lost to long-term surface disturbance, which is similar to Alternative A and more than under Alternative B.

Changes in Rangeland Health

Under Alternative C, grazing system and range improvements are designed to maximize livestock grazing while maintaining other resource values. Indirect adverse impacts in rangeland health similar to those described under Alternative A are anticipated under Alternative C due to the similarity in projected long-term surface disturbance.

The locations of livestock salt and mineral supplements generally are determined on a site-specific basis; however, they are not allowed in areas of special status plant species. In addition, range improvement projects are not allowed on special status species populations under Alternative C. These restrictions will restrict livestock grazing management flexibility and are anticipated to have the same impacts to livestock grazing as Alternative A.

Alternative D (Preferred Alternative)

Changes in AUM Allocations

The planning area remains open to livestock grazing and management remains organized under 224 grazing allotments. The livestock grazing use on public lands in vacant allotments and unallotted parcels is a discretionary action. The BLM can consider issuing 10-year renewable permits, temporary, nonrenewable permits, or not issuing grazing permits for small isolated parcels that currently are not permitted or leased for livestock grazing. Suspended AUMs can be activated for livestock use under Alternative D, except if the results of an evaluation based on the Wyoming Standards for Healthy Rangelands, range surveys, monitoring data, or other information determine that adequate forage is not available. Due to the relatively small size of the isolated parcels and small number of suspended AUMs, the beneficial impact of these actions is expected to be relatively minor and localized. Overall, the flexibility in management associated with Alternative D actions is anticipated to benefit livestock grazing management in the short term and long term.

The Christy Canyon allotment is designated a forage reserve, similar to Alternative B and is anticipated to result in similar long-term beneficial impacts by increasing flexibility for livestock grazing operators during times of drought. Livestock operators in the Lost Creek/Ryan Creek allotments comply with the same restrictions identified for Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed as described for Alternative A, resulting in similar impacts. Approximately 8,338 AUMs are anticipated to be lost over the life of the plan because of long-term surface disturbance, which is less than under alternatives A and B, more than under Alternative B.

Changes in Rangeland Health

Under Alternative D, grazing system and range improvements are designed to achieve management objectives. Indirect adverse impacts in rangeland health under Alternative D are anticipated from projected surface disturbance and associated spread of INNS; however, because projected long-term surface disturbance is less, anticipated impacts also will be less compared to Alternative A.

The locations of livestock salt and mineral supplements generally are not allowed within ¼ mile of special status plant species, water sources, riparian areas, NHTs, or aspen stands. Buffers to provide additional protection of resource values are considered on a case-by-case basis. In addition, range improvement projects are not allowed on special status species populations under Alternative D and buffers are considered on a case-by-case basis. Stricter VRM buffers for cultural resources and other high quality scenery, and town viewsheds may adversely affect range improvement developments.

Recreation management that may have beneficial impacts on rangeland health under the proposed Pine Creek Canyon and Raymond Mountain SRMAs include proposed restrictions on activities that can degrade soils and disrupt livestock activities such as dispersed camping and OHV and snow machine use. Rangeland health benefits from the proposed Dempsey Ridge SRMA and both MAs include the goal of no new mineral leasing and no further loss of habitat with mineral development, which may adversely affect range improvements. Reclamation of unnecessary roads is included in the SRMA and the Bear River Divide MA actions. In addition to salt lick and mineral supplement restrictions listed above, restrictions within the Dempsey Ridge SRMA include ¼ mile from specified cultural sites, which may have adverse effects to livestock management in the area. In the two proposed MAs, salt lick and mineral supplement restrictions include ¼ mile from sensitive wildlife areas (e.g., sage-grouse leks).

Restrictions on placement of supplements and range improvement projects will limit flexibility of livestock operations; however, the case-by-case management approach under Alternative D is anticipated to minimize adverse impacts to operators from these restrictions more than under Alternative A.

4.6.4.3 Conclusion

Although Alternative B projects the least acreage of surface disturbance and, therefore, is anticipated to reduce AUMs the least of all alternatives, it is the most restrictive on livestock grazing and, therefore, is anticipated to have the most adverse impact on livestock grazing management compared to all alternatives. The Christy Canyon allotment forage reserve designated under alternatives B and D is anticipated to benefit livestock grazing in the long term. However, in the short term there could be an adverse impact to livestock grazing in general because this forage may be taken out of the forage base in certain years. Alternatives A and C project the most acreage of surface disturbance and are the least restrictive on livestock grazing and, therefore, are anticipated to have similar adverse and beneficial impacts on livestock grazing. Alternative D projects the second lowest acreage of surface disturbance and is less restrictive on livestock grazing compared to Alternative B. The relatively low surface disturbance and greater management flexibility associated with Alternative D are anticipated to result in the most beneficial impacts to livestock grazing compared to other alternatives.

4.6.5 Recreation

This section describes the impact of each alternative on recreational uses of public lands in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse.

Direct impacts to recreation affect recreational use of public lands and facilities. For example, certain resource development actions might displace recreational uses from a given area, thus directly impacting recreation. An example of an adverse indirect impact is when competing uses of the land affect wildlife habitats, resulting in a decrease in big game populations and, therefore, a decrease in hunting (recreational) opportunities. Beneficial impacts to recreational resources include actions that improve the recreational setting, contribute to better recreational experience opportunities, and ultimately contribute to increased benefits from recreational use of public lands. Adverse impacts are those that negatively affect the recreational setting, detract from the recreational experience opportunities of users, or decrease benefits from recreational uses. Refer to maps 43 through 45 for recreation alternatives.

4.6.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- A site-specific analysis normally is conducted on the ground as RMP decisions are implemented.
- The BLM will not administer U.S. Bureau of Reclamation (USBR) lands. Only two resources involving USBR lands are addressed in this document: (1) campgrounds on USBR lands administered by the BLM for which the USBR pays the BLM, and (2) livestock grazing.

- The identification of SRMAs is assumed to benefit recreation compared to not identifying SRMAs.

4.6.5.2 Analysis of Alternatives

Analysis of potential impacts to recreation from alternatives considered management actions most likely to disrupt, prevent, or benefit recreational opportunities within the planning area. The location and intensity of projected mineral development in the planning area also were considered. Impacts to recreation are anticipated under all alternatives; however, the intensity of these impacts is expected to vary by alternative. Back Country Byways are discussed under the Special Designations section. Impacts to OHV use and visual resources are discussed in their respective sections.

Impacts Common to All Alternatives

Under all alternatives, activities related to resource development (e.g., construction of facilities, land clearing, and drilling activities related to minerals exploration and development; ROWs; and transportation) may result in adverse impacts to, the displacement of recreational opportunities, or the degradation of recreational experiences for the life of those projects. Conversely, some development activities present opportunities to improve legal access to public lands, as well as to improve roads, thereby improving recreational opportunities. In addition, management actions limiting development activities (e.g., no surface-disturbing activities, CSU restrictions, and “no-leasing” restrictions) and mineral withdrawals could benefit recreation by protecting recreational facilities and providing long-term assurance that areas traditionally used for recreational purposes will not be affected by future development activities.

Table 4-12 shows the SRMAs proposed under the alternatives. By identifying SRMAs, the respective areas become a higher priority for recreational management. SRMAs are anticipated to allow the BLM to respond to the need for more intensive management efforts, including construction funding for recreational facilities. If an area is not identified as an SRMA, it is an Extensive Recreation Management Area (ERMA). In an ERMA, recreation management objectives are identified, but are a lower priority, actions are custodial in nature and limited to addressing visitor health and safety, user conflict, and resource protection issues. Additional information on management of SRMAs and ERMAs in the planning area is identified in Appendix I.

Recreational visitation is affected by population growth and the relative attractiveness of recreational opportunities. Alternatives promoting industrial development encourage population growth in both the short and long terms, resulting in an increase in the demand for recreational use of public lands. Alternatives enhancing recreational resources increase their relative attractiveness, thereby increasing recreational demand. Recreational visitation increases accordingly.

Fish- and wildlife-dependent recreational opportunities increase or decrease in proportion to the overall productivity of habitats. Habitat management resulting in fish and wildlife population increases impacts recreational visitation. Habitat loss in response to allocation of lands and resources to competing industrial development could cause population decreases that, in turn, decrease recreational visitation and result in a long-term adverse impact.

As a state with a substantial tourism market, nonresident recreationists benefit from Wyoming opportunities, as well as provide economic benefits to the state. Nonresident visitation could be affected by the various alternatives; however, the level of impact on recreation in the planning area is not anticipated to be substantive. These impacts are discussed under the individual alternatives. Annual growth rates for nonresident recreation recently were estimated in a U.S. Forest Service (USFS) study (Betz et al. 1999), providing the basis for this analysis.

Table 4-12. Recreation Management Areas by Alternative

Area	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Pine Creek Canyon	–	SRMA	SRMA	SRMA
Raymond Mountain	–	SRMA	SRMA	SRMA
Oregon-California National Historic Trail	–	SRMA	SRMA	SRMA
Remainder of Planning Area	ERMA	ERMA	ERMA	ERMA
Dempsey Ridge	–	SRMA	SRMA	SRMA

ERMA Extensive Recreation Management Area
SRMA Special Recreation Management Area

Alternative A

Recreation Management

Surface-disturbing Activities. Under Alternative A, the projected long-term surface disturbance from BLM actions results in the highest disturbance acreage of all alternatives (refer to Table 4-1). These management actions could cause direct and indirect adverse impacts to recreational resources as conflicts between recreational use and development occur in developed areas. The quality of dispersed recreation will diminish over time in areas where large-scale development occurs. The impacts to recreation from surface-disturbing activities under Alternative A, while minor, are anticipated to be adverse and similar in type to all other alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative A are anticipated to be beneficial and similar in type to all other alternatives. The greater the acreage withdrawn or closed to development, the greater the beneficial impact to recreation. Alternative A withdraws or closes little to no acreage; therefore, it is considered the least beneficial to recreational uses of the land.

Special Recreation Management Areas

Under Alternative A, no SRMAs are proposed for the planning area. The entire planning area would be managed as an ERMA. Recreation management objectives for the ERMA would be developed to address visitor health and safety, user conflict, and resource protection. Recreational management actions would be restricted to custodial actions adversely impacting recreational resources.

Recreational Use

Other Resource Management Actions. Consolidating land ownership and additional public access to lands within the planning area increases recreational opportunities for recreational users seeking both primitive and more-developed recreational experiences.

Managing certain resources could influence recreational use patterns, opportunities, and preferences within the planning area to a limited extent. For example, current management actions for vegetation, water, soil, livestock grazing, and fire management are anticipated to influence the distribution of fish and wildlife throughout the planning area, thereby influencing recreational use. Increases in fish and wildlife populations translate to increased recreational opportunities, such as hunting, fishing, and viewing wildlife.

Cultural, paleontological, and VRM limitations could preclude the development of recreational facilities and opportunities in localized areas by protecting resources of interest. Forest-management activities temporarily displace recreational use from areas where vegetation treatments occur, but are short-term in

duration and limited to specific locations within the planning area. None of these actions substantially alters the opportunities for, or distribution of, recreational activities within the planning area.

Under Alternative A, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, and photography) related to these resources. Under Alternative A, nonresident recreational visitation is anticipated to increase annually in the short term for dispersed recreation (Betz et al. 1999).

Alternative B

Recreation Management

Surface-disturbing Activities. Under Alternative B, the projected long-term surface disturbance from BLM actions results in the lowest disturbance acreage of all alternatives (refer to Table 4-1). These management actions could result in direct and indirect adverse impacts to recreational resources, as conflicts between recreational use and development may occur in all disturbed (commercially developed) areas. The quality of dispersed recreation will diminish over time in areas where large-scale development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative B are less than those identified under Alternative A.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative B are beneficial and similar in type to all other alternatives. Alternative B closes and withdraws more acreage to mineral resources than all other alternatives, resulting in the greatest beneficial impact to recreation of all the alternatives.

Special Recreation Management Areas

Under Alternative B, four SRMAs are identified (Table 4-12) and the remaining planning area is identified as an ERMA. Identifying SRMAs and the ERMA are anticipated to benefit recreation more than Alternative A. The Dempsey Ridge SRMA provides more protection for recreational resources compared to Alternative A because it does not authorize mineral material sales or free use permits and pursues mineral withdrawals. Alternative B also provides for the least amount of forest-management activities in Dempsey Ridge and, accordingly, poses the least potential to adversely affect recreational uses due to vegetation treatments.

The proposal for the Pine Creek Canyon, Raymond Mountain, and Oregon-California National Historic Trail to move to SRMA status provides additional protection to their recreational opportunities. The recreational settings are enhanced through the long term. The quality of recreational experiences improves, and benefits from recreational activities increase.

Recreational Use

Other Resource Management Actions. Under Alternative B, management actions concerning vegetation, water, soil, livestock grazing, and fire enhance fish and certain desirable wildlife habitats throughout the planning area and preserve the landscape aesthetics for recreation to a greater extent than under Alternative A.

The increased restrictions further protect resources of interest to the recreating public compared to Alternative A. For example, because forestlands are managed for watershed stability, wildlife habitats, and recreational considerations, beneficial long-term impacts to recreation are anticipated under Alternative B. Under Alternative B, nonresident recreational visitation increases annually in the short term for dispersed recreation (Betz et al. 1999).

Alternative C

Recreation Management

Surface-disturbing Activities. Under Alternative C, the projected long-term surface disturbance from BLM actions is anticipated to be similar to, but less than, Alternative A (refer to Table 4-1). These actions result in direct and indirect adverse impacts to recreational resources as conflicts between recreational use and other resource development occurs. The quality of dispersed recreational experience opportunities diminish over time in areas where intensive development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative C are similar to, but less than, those identified under Alternative A.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative C are beneficial and similar in type to all other alternatives. Alternative C removes or closes little or no acreage to mineral development, resulting in the least beneficial impact to recreation of all alternatives, similar to Alternative A.

Special Recreation Management Areas

Under Alternative C, four SRMAs are proposed and the remaining planning area is identified as an ERMA. The projected impacts to recreation in these areas are anticipated to be similar as those impacts discussed under Alternative B.

While SRMAs may incorporate management actions to enhance and protect recreational values, they do not preclude development of other, often competing resources. Since Alternative C emphasizes resource use over resource conservation, it can be expected that recreation uses will be in more direct competition with other resource use opportunities. Proactive recreation management actions under Alternative C, while beneficial, are more beneficial than Alternative A, but less beneficial than all other alternatives.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative C are similar to those described for Alternative A with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources, but are less restrictive. The lesser restrictions are not expected to impact recreational use patterns to a substantial degree. In addition, visual resources are managed according to the 2004 inventory, which more accurately categorizes the visual resources of the planning area and provides for more suitable management of the resource compared to Alternative A. Visual resources of interest are better protected compared to Alternative A, providing for long-term protection of key aesthetic resources.

While seasonal motorized vehicle restrictions in crucial big game areas are not carried forward under Alternative C, all other wildlife management actions afford the least protection to wildlife resources compared to other alternatives. Alternative C has the greatest potential for degrading the wildlife resource, which could adversely impact recreational users relying on wildlife resources. At the same time, relaxation of protective measures provide minor benefits to recreational users seeking a more rural and (or) motorized recreational experience, since this alternative affords the least restriction to access. However, this alternative could have an adverse impact on the quality of the recreational experience.

Alternative C has the greatest potential for access and road infrastructure acquisition; however, it also has the most potential to displace recreational users and diminish the quality of recreational experiences throughout the planning area, including areas known to have sensitive resource values. Under Alternative C, nonresident recreational visitation increases annually in the short term for other dispersed recreation under this alternative (Betz et al. 1999).

Alternative D (Preferred Alternative)

Recreation Management

Surface-disturbing Activities. Under Alternative D, the projected long-term surface disturbance from BLM actions is less compared to Alternative A (refer to Table 4-1). These management actions could result in direct and indirect adverse impacts to recreational resources, as conflicts between recreational use and development may occur in disturbed (commercially developed) areas. The quality of dispersed recreation diminishes over time in areas where large-scale development occurs. Potential adverse impacts to recreational resources from surface-disturbing activities under Alternative D are less than those identified in Alternative A (Appendix M).

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative D are beneficial and similar in type to all other alternatives. Alternative D is more beneficial to recreation than alternatives A and C, but less beneficial than Alternative B.

Special Recreation Management Areas

Under Alternative D, four SRMAs are identified and the remaining planning area is identified as an ERMA. Identifying SRMAs and the ERMA are anticipated to benefit recreation more than Alternative A.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative D proactively identify and pursue opportunities to acquire public access to areas with high recreational use value within the planning area to increase recreational opportunities for the public. Projected impacts to recreation under Alternative D are similar to those described for Alternative B.

Management actions and related impacts under Alternative D are similar to those described for Alternative B with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources. Visual resources are managed according to the updated visual inventory, which manages the current visual resource conditions and more accurately provides for the protection of key aesthetic values impacting the quality of recreational experiences.

Fewer adverse impacts on recreational users are expected due to the minor changes in protective actions to fish and wildlife habitats under Alternative D. Beneficial impacts will be greater and the adverse impacts less under Alternative D than under Alternative A.

Nonresident recreational visitation increases annually in the short term for other dispersed recreation under this alternative (Betz et al. 1999).

4.6.5.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to forecast impacts to recreational resources. Meaningful differences in surface disturbance, areas closed or withdrawn from mineral development, identification of SRMAs, proactive recreation management actions, and other resource management actions form the basis for the following conclusion: impacts to recreation resources from the alternatives are anticipated to be similar in type, but different in intensity.

Although none of the alternatives is expected to impact recreational use, distribution, or experience opportunities substantially, Alternative B enhances the recreational experience of users expecting a more primitive recreational experience more than any of the other alternatives by limiting development to the greatest extent. Alternative B provides the greatest protection for wildlife resources, providing long-term benefits to hunters. The SRMAs proposed under alternatives B, C, and D provide more recreational opportunities compared to Alternative A. Alternative C provides more access, which benefits some recreational users, but also allows for the greatest amount of development. More development adversely

impacts recreational users, especially those seeking recreational experiences in more natural settings or experiences dependent on significant fish and wildlife populations.

In general, displacement of dispersed recreational use tends to be localized and results from management activities related to competing resource-development activities. Long-term displacement occurs where concentrated large-scale development is located. Such development could reduce the quality of the recreational experience and displace recreational users over time, but will be spatially limited. Management actions directed at improving recreational opportunities enhance both primitive and developed recreational experiences.

Alternative D provides more balanced recreational experience opportunities for both natural and modified settings as compared to alternatives A and C. Alternative D provides the most flexibility for management to enhance the recreational experience of those users wanting a more developed (rural) recreational experience, as well as more natural settings for recreational activities.

4.6.6 Travel Management

The following section describes the impacts of each alternative on travel management in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to travel management. Direct impacts to travel management include actions that add, close, or limit road use in the planning area.

4.6.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The travel network (i.e., highways, railways, airports) within the planning area is essentially complete and no major travel infrastructure facilities are anticipated. Developing new roads for recreational access will be limited.
- Additional roads will be developed, as needed, to support expanded oil and gas operations in compliance with the multiple use concepts within FLPMA; the travel management program may adopt some of these roads for specific uses, such as recreational access.
- Use of roads will increase based on anticipated increases in oil and gas activity.
- Road design and construction considers other resource programs to minimize impacts.
- Users generally follow rules and regulations for motorized vehicle use; however, some users do not follow rules and unauthorized travel and OHV use in closed areas impact vegetation, soils, water, wildlife, etc.
- The greater the area of authorized roads open to motorized vehicles, the greater the benefit to travel management.
- Permanent or temporary closures of roads deemed unauthorized or that create unwanted resource concerns also are considered beneficial to the travel management program.
- Travel management planning generally improves travel management by limiting new roads to only those that are needed and increasing the efficiency of the roadway network by directing travel to preferred routes (e.g., utilizing roads that provide the shortest distance between two points, limiting travel on roads designated for specific purposes, etc.).
- Reductions to road density result in beneficial impacts to some resources (e.g., big game, soils), but may require additional effort for users (e.g., longer travel routes).
- Disposal of mineral materials from BLM lands will continue to be needed to support road construction and maintenance.

4.6.6.2 Analysis of Alternatives

Allowable uses and management actions that could impact travel management primarily include mineral development, access, and fish and wildlife resources. As travel management is impacted by the alternatives, travel management can, in turn, impact other resources. The impacts of travel management on other resource topics (i.e., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The alternatives allow varying amounts of new development directly and indirectly, which will be expected to meet the demand for recreational access. Each of the alternatives includes an increase in the level of travel management planning to improve travel management within the planning area. Temporary road closures due to health and safety risks and (or) resource damage, reclaiming roads and two-track trails not needed for resource management, and closing of unauthorized two-track roads that cause unnecessary resource damage are considered beneficial to travel management because they reduce management efforts for roads deemed unnecessary and (or) create unnecessary impacts on resources. However, certain resource management actions could adversely impact the travel management program by placing substantial limitations on the development of travel management or limiting existing access to portions of the planning area for desired multiple uses.

The resource management actions that could affect travel management include cultural resources, fish and wildlife, paleontological resources, soils, special status species, riparian and wetland communities, VRM, water resources, recreation, OHV, and each of the special designations. The increased level of development associated with oil and gas and other minerals will modify the road network, which will provide additional access through the planning area. These access developments will provide opportunities for recreation, particularly OHV use and dispersed recreational activities. Management of new roads requires routine and emergency maintenance of these roads. Other resource considerations (e.g., cultural resources, special status species) may constrain routing alternatives, require that other routing alternatives be adopted, increase acquisition costs, or determine that access acquisition will not be feasible. The Kemmerer Field Office continues to manage approximately 23 miles of existing snow machine trails in the planning area.

Alternative A

Alternative A results in the long-term addition of approximately 932 miles of new roads within the planning area, primarily due to oil and gas development. These new roads are considered a beneficial impact to the travel management program.

Alternative A introduces minimal limitations to the use of existing roads within the planning area, as only existing limitations are carried forward. Seasonal closures for big game winter ranges continue to be limited to Slate Creek, Rock Creek, Bridger Creek, and Raymond Mountain crucial big game ranges from January 1 to April 30. Existing roads and trails are open for use, with travel management planning limited to field-development plans. There continue to be no objectives for open road density and no specific measures to protect special status plants species. Ongoing issues, such as unauthorized use of roads constructed for oil and gas, livestock, and so on, that currently are not gated may persist, resulting in continued impacts on other resources. While Alternative A presents few constraints to existing and future roads, it also includes few measures to improve travel management within the planning area through the incorporation of travel management plans.

Alternative A seeks to gain legal access to areas that will be intensively managed for timber production, as well as to obtain temporary easements for specific actions. In addition, access is to be acquired for the following high priority areas for land management: Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and the Bear River Divide area.

Alternative B

Alternative B includes the lowest amount of new roads at 873 miles, primarily due to oil and gas development, of the four alternatives. However, this is only about 6-percent less than under the other alternatives.

Alternative B introduces additional limitations to the use of existing roads, as well as the construction of additional roads by designating the entire planning area as open, closed, or limited. Increased seasonal closures include closing crucial big game ranges to motor vehicle use from November 15 to April 30. In addition, open road density within big game winter ranges requires travel management planning to minimize open road density such that an average of ½ mile of open road per square mile is not exceeded. Travel management planning throughout the planning area is expanded to include full public involvement under this alternative. Alternative B includes development of a scenic Back Country Byway from Kemmerer over Dempsey Ridge to Fossil Butte and back to Kemmerer. Alternative B includes the most constraints to motor vehicle travel on roads within the planning area, while also increasing the level of travel management planning, thereby improving travel management more than Alternative A. Legal access, easements, and access acquisition are the same as described under Alternative A.

Alternative C

Alternative C results in the long-term addition of approximately 932 miles of new roads (same as under Alternative A), primarily due to oil and gas development.

Travel management under Alternative C will be similar to that described under Alternative A, although it further reduces limitations to travel management by eliminating existing seasonal restrictions (i.e., closure of big game winter ranges, etc.). Therefore, it will reduce constraints on vehicle travel and provide limited improvements to travel management.

Alternative C seeks to gain legal access across private land in support of resource programs benefiting travel management. In addition, access is to be acquired for the following high priority areas for land management: Redeye Basin, Commissary Ridge, Raymond Mountain WSA, Dempsey Basin, Slate Creek, Rock Creek area, Little Muddy Creek, Meeks Cabin, Westfork, Graham Reservoir, Church Buttes, Wildcat Butte, Porter Hollow, Lincoln Highway, and the Bridger Antelope Trap.

Alternative D (Preferred Alternative)

Alternative D results in the long-term addition of approximately 932 miles of new roads (same as under Alternative A) primarily due to oil and gas development.

Travel management under Alternative D will be similar to that described under Alternative B, with a few exceptions that are less constraining toward motor vehicle travel. Seasonal road closures are shorter than under Alternative B and similar to those under Alternative A (January 1 to April 30), road density in big game winter range is 2 miles per square mile, and measures to protect special plant status species are less stringent. Alternative D includes the scenic Back Country Byway described under Alternative B. Travel management planning includes a larger portion of the planning area than under alternatives A and C, but less than under Alternative B.

4.6.6.3 Conclusion

Alternatives A, C, and D result in the addition of 932 miles of new roads within the planning area, while Alternative B adds 873 miles. Alternative C provides the least number of constraints to travel management in favor of resource protection, although it also includes the lowest level of planning to improve travel in the planning area. Alternative A is similar to Alternative C, but with somewhat higher constraints for resource protection. Alternative B provides a high level of constraints to travel management in favor of resource protection, but also includes a high level of travel management planning to improve the efficiency of the planning area road network. Alternative D is similar to Alternative B, but

is somewhat less constraining in regard to resource protection and includes a lower level of travel management planning.

4.6.7 Off-Highway Vehicles

The following section describes the impacts of each alternative on OHV use and management, including snow machines, in terms of direct, indirect, and short- and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to OHV use and management in the planning area. Direct impacts to OHV use include designation of lands within the planning area as open, designated, seasonally closed, and closed to OHV use. Restrictions to protect resource values (e.g., cultural) also are considered direct impacts to OHV use. Indirect impacts to OHV use include management actions affecting access to public lands within the planning area. For example, authorized energy development in the planning area may require development of roads, which can then be used for OHV use. Refer to maps 46 through 53 for OHV and snow machine use and management.

4.6.7.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- OHV use is motor vehicle use of the nonhighway road and trail network on public lands. It includes all resource-related activities, including recreation and those associated with livestock grazing and mineral development.
- OHV use will increase at a faster pace than the rate of population growth because of the increasing popularity of off-road travel, improvements to OHV technology, and intensity of development and use of public lands.
- Recreational OHV use is highest within large blocks of public land with legal access and with special resource values, such as those associated with hunting and fishing.
- If adequate infrastructure exists and is maintained, the majority of recreational OHV users choose routes that minimize environmental degradation.
- The analysis assumes OHV designations are to be fully implemented 5 years after approval of this RMP.
- Rules and regulations for motorized vehicle use generally are followed by users; however, some users do not follow rules, and unauthorized travel and OHV use in closed areas impact vegetation, soils, water, wildlife, etc.

4.6.7.2 Analysis of Alternatives

Impacts to OHV use from alternatives generally will occur under all alternatives. As the alternatives impact OHV use, OHV use, in turn, impacts other resources and resource uses. For example, alternatives that restrict OHV use in sensitive areas are intended to protect resource values (e.g., wildlife and cultural) in those areas. While these restrictions are considered an adverse impact to OHV use, they benefit the resource values they are designed to protect. The impacts of these restrictions on OHV use are described in this section. The impacts of OHV use on other resources and resource uses are described in the appropriate impacted resources in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to OHV use because of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative; therefore, impacts to OHV use are described under individual alternatives. All alternatives may designate areas within the planning area as open, designated, seasonally closed, or closed. The greater the acreages open to OHV use, the greater the

beneficial impact to this resource use. The greater the area closed (permanently or seasonally) to OHV use, the greater the adverse impact to this resource use.

Impacts from the "Open" Designation. This designation is beneficial to users of OHVs, all-terrain vehicles, motorcycles, and other off-road vehicles because it provides an appropriate, managed location for a type of OHV recreation considered inappropriate in other areas. Open designations often allow unmanaged road proliferation, damage to or loss of vegetation, soil erosion, degradation of the visual quality of the landscape, and adverse effects on cultural resources adjacent to open areas. Such designations are often in direct conflict with other resource values, such as wildlife habitats and scenic quality.

Impacts from the "Designated" Designation. Under this designation, the incremental growth of unauthorized user-created roads and trails is curtailed, as would be unauthorized OHV use. OHV use is limited to a specific designated network of roads and trails. Such a limitation is beneficial to soils and limit the spread of INNS, but has no impact on commercial or industrial uses of public lands because roads necessary to facilitate those uses are handled under permits or authorizations. This designation does not affect public access, nor does it diminish OHV opportunities. Further, it has no impact on other resource uses, such as mineral development, because under such a designation, access roads are authorized as needed.

Impacts from the "Seasonally Closed" Designation. Under this designation, specific portions of the planning area (e.g., crucial big game winter range) are closed during specific timeframes. This designation is a direct adverse impact on OHV use, but less adverse than the closed designation because the areas are open during other times of year.

Impacts from the "Closed" Designation. This designation adversely impacts OHV use by eliminating motor vehicle access in these areas and limiting access to nonmotorized means (e.g., foot or horseback). Closed designations adversely affect uses requiring road access, such as minerals when there is a need for road access in closed areas to develop the minerals. However, no alternative proposes more than 3 percent of BLM-administered surface to be closed, so the impact is relatively minor.

Designations for snow machine use include designated, limited, and closed areas in the planning area. Similar to OHV designations, areas designated as closed to snow machines are direct adverse impacts to snow machine use. The greater the acreage closed to snow machine use, the greater the adverse impact to this resource use. The greater the acreage open to snow machine use, the greater the beneficial impact to this resource use. Areas limited to snow machine use are seasonal limitations as defined in the alternatives (see Table 2-3). All alternatives designate 22.5 miles of snow machine trails in the planning area, benefiting this resource use.

Alternative A

Alternative A continues the current OHV use designations, including approximately 287,160 acres (20% of BLM-administered surface) seasonally closed and approximately 32,787 acres (2% of BLM-administered surface) closed to OHV use. These closures are direct adverse impacts to OHV use in the planning area. However, under Alternative A, limited off-trail travel is allowed for dispersed use and to perform necessary tasks, benefiting OHV users in the planning area. No areas in the planning area are identified as open under Alternative A.

Alternative A closes the least acreage (26,115 acres) to snow machine use of all alternatives and designates approximately 291,653 acres of BLM-administered surface as limited. The acreage designated as limited snow machine use is the second highest of all alternatives. Raymond Basin is open for snow machine use. Alternative A considers new snow machine trails on a case-by-case basis, benefiting this resource use. These designations result in both beneficial and adverse impacts to snow machine use.

Alternative B

Alternative B closes the greatest acreage (33,896 acres) of BLM-administered surface to OHV use of all alternatives, including the Raymond Mountain WSA and other areas identified in Table 2-3, adversely impacting OHV use in the planning area. However, the total area closed is still less than 3 percent of the BLM-administered surface. Alternative B also seasonally closes the largest area (569,609 acres) to OHV use in the planning area, resulting in the greatest adverse impact to OHV use of all alternatives. Alternative B does not allow off-trail OHV travel in the planning area, adversely impacting OHV users in the planning area.

Alternative B closes the greatest acreage (32,802 acres) to snow machine use and designates the greatest acreage (569,609 acres) as limited of all alternatives in the planning area, resulting in greater adverse impacts to snow machine use than Alternative A. Alternative B does not allow new snow machine trails to be developed in big game crucial winter range, adversely impacting snow machine use in the planning area.

Alternative C

Alternative C closes the same acreage to OHV use as Alternative A, resulting in the same impacts to OHV use as Alternative A. No seasonal closures to OHV use are implemented under Alternative C, resulting in greater beneficial impacts to OHV use than Alternative A and the other alternatives. In addition, Alternative C opens approximately 2,791 acres to OHV use on BLM-administered surface. In addition to allowing off-trail travel as identified under Alternative A, Alternative C allows this type of travel (up to ½ mile off existing roads and trails) to perform necessary tasks, benefiting OHV use in the planning area. Alternative C has the greater beneficial impacts to OHV use than Alternative A, but has the greatest potential for user conflicts.

Alternative C closes the same acreage to snow machine use as Alternative A, resulting in the same impacts as Alternative A. No areas are designated as limited for snow machine use under Alternative C, benefiting snow machine use in the planning area. New snow machine trails are considered on a case-by-case basis as under Alternative A.

Alternative D (Preferred Alternative)

Alternative D closes the second greatest acreage (33,037 acres) to OHV use on BLM-administered surface; however, this acreage is less than 3 percent of BLM-administered surface so relatively minor impacts are anticipated. Alternative D seasonally closes the same acreage as Alternative A, resulting in similar impacts as Alternative A. In addition, approximately 4,506 acres are considered designated in the planning area and approximately 159 acres are open to OHV use in the planning area. Alternative D allows off-trail travel similar to Alternative A, but also allows greater distances of off-trail travel with a letter of authorization. Alternative D is anticipated to have beneficial impacts to OHV use similar to, but greater than, Alternative A.

Alternative D closes the same acreage to snow machine use as Alternative B and designates the second lowest acreage (258,851 acres) as limited for snow machine use of all alternatives. New snow machine trails are considered on a case-by-case basis as under Alternative A. Alternative D is anticipated to result in adverse impacts similar to, but less than, Alternative A.

4.6.7.3 Conclusion

Alternative B implements the most restrictions to OHV use of all alternatives and substantively changes OHV use designations compared to Alternative A. Alternative C implements the least restrictions to OHV use of all alternatives. Alternative A is similar to Alternative C; however, Alternative A implements more restrictions to OHV use than Alternative C. Alternative D has more restrictions than Alternative A, but it allows for better management of OHV use by opening and designating more areas for OHV use. Alternative D has the least potential for user conflicts.

4.6.8 Visual Resources Management

This section describes the anticipated impacts of each alternative on VRM in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to visual resources.

Anything that draws the viewer's attention and contrasts with the basic elements (form, line, color, or texture) of a given landscape, impacts the viewer's perceptions, creating impacts to the visual resources. Changes from any source that introduce intrusive elements into the existing landscape could impact visual resources. Direct impacts resulting from on-the-ground activities may be either adverse or beneficial. Adverse impacts include the addition of visual intrusions, such as roads and facilities, or the removal of natural materials (i.e., soil, vegetation). Beneficial impacts are normally a direct result of post-disturbance reclamation efforts. Indirect impacts relate to the management of other resource values, in which specific actions may limit, as well as increase, the effectiveness of the VRM program. Actions that occur on lands not administered by the BLM (regardless of ownership) can impact the visual resources of the adjacent public lands. Refer to maps 54 through 60 for visual resource management.

4.6.8.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future development and other land use activities described under each alternative are compared to recommended VRM classes and the existing visual conditions to determine potential impacts.
- To adequately describe potential impacts of each alternative in the context of the capacity for differing landscapes to absorb visual intrusions, actions potentially impacting visual resources were divided into general categories: high-profile developments, low-profile or short-term projects, and resource management prescriptions.
- VRM classes will not extend across USBR lands.

4.6.8.2 Analysis of Alternatives

Allowable uses and management actions that could impact visual resources primarily include surface development and fire and vegetation management. As visual resources are impacted by the alternatives, VRM can, in turn, impact other resources. The impacts of VRM on other resource topics (i.e., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to visual resources because of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative; therefore, impacts to visual resources are described under individual alternatives.

Activities that are large in scale relative to the landscape in which they occur create dominant long-term adverse visual impacts. Even when such activities meet the established VRM objectives, their impacts should be mitigated, where possible. Small-scale, dispersed development (e.g., range improvements) will have a lesser impact due to the ability to fit these improvements into natural landscapes. Visual resources in areas with a high potential for oil and gas development are likely to be more heavily impacted through the long term.

Short-term impacts associated with forest management include changes in the natural line, color, form, and texture of harvest areas, as well as the introduction of new visual intrusions, such as haul roads. These impacts are anticipated to adversely impact visual quality; however, long-term impacts diminish as forests regenerate and may constitute an eventual beneficial impact to visual resources.

Alternative A

Visual Resource Management. Under Alternative A, management of VRM will continue according to the 1986 VRM maps. No specific prescriptions are identified under Alternative A to protect the viewshed of the Bridger Antelope Trap; however, all historical, archeological, and cultural sites eligible for or listed on the NHRP are protected or mitigated. The current restrictions for visual intrusion within 1,320 feet from either side of a historic trail or within the visual horizon of the trail will continue. These proactive VRM actions result in a beneficial impact to visual resources.

Surface-disturbing Activities. Current management allows for large-scale disturbances, high-profile intrusions, and concentrated development. As a result, high-profile and concentrated development of nonrenewable resources is expected to continue. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact visual resources. Under Alternative A, the projected short-term and long-term surface disturbance from BLM actions results in the highest disturbance acreage of all the alternatives (refer to Table 4-1). The intensity of impacts to visual resources is expected to be primarily adverse.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, cultural resources, and special designations) under Alternative A provide additional protection for visual resources. This and other management actions of this type result in beneficial impacts to visual resources because they limit the potential for disturbance. However, fewer restrictions on surface-disturbing activities are provided under Alternative A than under alternatives B, C, and D. Therefore, additional protection for visual resources under Alternative A is less than all other alternatives.

No defined current management exists for wind-energy development. As such, wind-energy development, such as the placement of turbines and ancillary structures, could result in an adverse impact to visual resources.

Vegetation Management. Vegetation management under Alternative A is applied to varying plant communities in a limited fashion. The use of prescribed fire and wildland fire suppression could create adverse impacts to visual resources. Fuel-reduction methods, such as mechanical, chemical, or biological vegetation treatments and the use of mosaic burn patterns, minimize impacts to visual resources.

Under Alternative A, adverse impacts to visual resources resulting from mechanical, chemical, or biological vegetation treatments are anticipated to be short-term. Long-term impacts from vegetation treatments will most likely be beneficial to visual resources.

Alternative B

Visual Resource Management. Under Alternative B, the Raymond Mountain WSA would be managed as VRM Class I (see Glossary). Class II visual resources around all sensitive roads, NHTs, campgrounds, towns, and NRHP-listed resources will receive a protective 3-mile buffer. Class III visual resources will include areas of high human disturbance and low visual stimulation (including boundaries of the Pine Creek Ski Area and Lion's Club Park R&PP leases), and Class IV will include the remaining acreage of the planning area. Alternative B also preserves the viewshed within 10 miles of the Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs by prohibiting ROW corridors and other developments with structures greater than 12-feet high. The viewsheds of NHT segments are preserved for 10 miles for high management level segments, 5 miles for medium management level segments, and ½ mile for low management level segments under Alternative B. However, these stipulations are specific to areas where the visual characteristics of the setting are uncompromised by modern intrusion. Given these VRM prescriptions, Alternative B provides more protection to visual resources than all other alternatives. These proactive management actions result in a beneficial impact to visual resources.

Surface-disturbing Activities. The impacts to visual resources from surface-disturbing activities under Alternative B are anticipated to be less than under all other alternatives. Under Alternative B, the projected short-term and long-term disturbance acreages from BLM actions are the lowest of any alternative (refer to Table 4-1). Relative to current management, large-scale disturbances, high-profile intrusions, and concentrated development are limited under Alternative B. In addition, additional restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) provided additional protection for visual resources under Alternative B. For example, under Alternative B, wind-energy development is prohibited in areas of high resource values. As such, wind-energy development does not pose an adverse impact on visual resources. Alternative B is anticipated to have the greatest beneficial impacts or visual resources.

Vegetation Management. Vegetation management prescriptions under Alternative B promote age and species diversity among differing plant communities, with an emphasis on mountain shrub, sagebrush, and forest communities. Large, contiguous blocks of vegetation communities will be managed to maintain and increase old growth conditions and adopt connectivity wherever possible. The long-term impacts to visual resources from management activities are anticipated to be beneficial. In addition, 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA will be managed by prescribed fire to stimulate the natural alteration of vegetation. Soil disturbances related to fire suppression are not allowed without consent from the authorized officer. Although such impacts, should they occur, will represent an adverse impact, they will likely be short-term.

Overall, Alternative B affords more protection to visual resources and results in fewer adverse impacts to visual resources than all other alternatives. In addition, Alternative B considers existing conditions throughout the planning area and, therefore, increases the potential to achieve visual resource goals.

Alternative C

Visual Resource Management. With the exception of the Raymond Mountain WSA, which will be managed as a VRM Class I, Alternative C will continue to manage visual resources according to the 1986 VRM maps. No other specific prescriptions are identified under Alternative C to protect the viewshed of particular visual resources, such as the Bridger Antelope Trap or NHT segments. However, current restrictions for visual intrusion within 1,320 feet from either side of a historic trail or within the visual horizon of the trail will continue. As such, Alternative C will be slightly more protective of visual resources than Alternative A, but less protective than alternatives B and D.

Surface-disturbing Activities. The impacts to visual resources from surface-disturbing activities under Alternative C are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to visual resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. Under Alternative C, the projected short-term and long-term disturbance acreages from BLM actions result in the second highest disturbance acreage of all the alternatives (refer to Table 4-1).

Fewer restrictions on surface-development activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C than under alternatives B and D; therefore, additional protection for visual resources under Alternative C is less than alternatives B and D. For example, under Alternative C, wind-energy development is allowed with some restrictions, except in the Raymond Mountain WSA and the Bridger Antelope Trap. Alternative C is slightly more protective of visual resources than Alternative A, but less protective than alternatives B and D.

Vegetation Management. Vegetation management under Alternative C is similar to the description under Alternative B, but realized on a smaller scale, as the area managed is smaller. The management to limit habitat fragmentation still represents a beneficial impact to VRM compared to Alternative A. Soil disturbances related to fire suppression will be allowed only with the consent of the BLM authorized officer. As such, visual impacts resulting from both wildland and prescription fires are expected to be

slightly less than those under Alternative A. Overall, Alternative C affords more protection to visual resources and results in less adverse impacts to visual resources relative to Alternative A.

Alternative D (Preferred Alternative)

Visual Resource Management. Similar to alternatives B and C, the Raymond Mountain WSA will be managed as a VRM Class I under Alternative D. A visual corridor extending up to 1 mile will be created for Class II visual resources, such as the Sublette Cutoff, the Slate Creek Cutoff, portions of the Oregon-California Trail, and part of the Oregon-Mormon-California Trail south of I-80 and east of Bigelow Bench. Other visual resources, such as the area from Slate Creek Ridge north and west of U.S. Highway 189 to U.S. Highway 233, the area of Oyster Ridge northeast of Kemmerer, the northeast portion of the planning area north and east of U.S. Highway 30, and the Star Valley area, also will be managed as VRM Class II. In addition, a 3-mile buffer on either side of State Highway 414 will protect other Class II values. Class III resources include all areas not designated Class I, II, or IV, and will be managed as such. Class IV areas will be managed in consideration of higher energy development potential and include areas such as Boundary Ridge, checkerboard lands southeast of State Highway 189, and areas north and south of I-80, excluding the federal sections that contain the Bridger Antelope Trap and high value NHT segments.

Alternative D also preserves the viewshed within 3 miles of the Bridger Antelope Trap juniper fence, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs by prohibiting ROW corridors and other developments with structures greater than 12-feet high. In addition, Alternative D will preserve the viewshed within 3 miles of high management level NHT segments and other historic trail segments in the Tunp/Dempsey Trail area. Under Alternative D, the viewsheds of NHT segments also are preserved for 1 mile for high management level segments, ½ mile for medium management level segments, and will protect low management level segments to existing VRM classes. However, these stipulations are specific to areas where the visual characteristics of the setting are uncompromised by modern intrusion and do not create exclusion zones. These proactive management actions result in a beneficial impact to visual resources. As such, Alternative D provides more protections to visual resources than alternatives A and C, but is less protective than Alternative B.

Surface-disturbing Activities. Under Alternative D, the projected short-term and long-term disturbance acreage from BLM actions result in the third highest disturbance acreage (refer to Table 4-1). As a result, the intensity of adverse impacts to visual resources from surface-disturbing activities under Alternative D is anticipated to be less than under alternatives A and C.

Relative to current management, large-scale disturbances, high-profile intrusions, and concentrated development are expected to continue under Alternative D. For example, wind-energy development in the planning area is less restricted than under Alternative B.

Vegetation Management. Under Alternative D, the impacts of mechanical, chemical, and biological vegetation treatments are similar to those under Alternative B. Alternative D will manage large, contiguous blocks of vegetation communities to maintain old growth conditions and adopt connectivity wherever possible. Alternative D does not seek to increase the areas designated as old growth communities; however, the long-term impacts to visual resources from management activities are anticipated to be beneficial.

4.6.8.3 Conclusion

With much of the BLM-administered minerals and surface ownership located within VRM Class IV areas, there will be minimal restrictions on mineral development for protection of visual resources under all alternatives. Alternatives B and D are anticipated to limit the potential impact to visual resources. Under alternatives A and C, the direct impact to the visual setting associated with surface disturbance and

facility development continues throughout the planning area and has the potential to impact areas highly valued by the public, such as cultural sites, historic trails, and recreational areas.

Overall, Alternative B, followed by Alternative D, produces the least adverse impacts to VRM because of restrictions imposed by management actions. In addition, Alternative B has the greatest potential for long-term beneficial impacts to visual resources through vegetation management that seeks to restore historic conditions and increases the designated acreage of old growth communities.

4.7 Special Designations

Lands within the planning area designated for their unique natural, historic, scenic, or recreational resources are referred to as special designations. Special designations include Areas of Critical Environmental Concern (ACECs), RNAs, Wild and Scenic Rivers (WSRs), WSAs, and Back Country Byways (BCBs). Lands established for other management for resource values or resource uses, but lacking a special designation, are Other Management Areas (MAs). An ACEC is a regulatory designation created in the FLPMA, and can be established only during the land use planning process. An MA, on the other hand, is a management decision and can be established at any time as long as the MA conforms to the current RMP and is warranted. Alternatives to current management propose specific lands as special designations and identify areas for other management within the planning area. Typically, special designations and MAs constrain some resource uses within their boundaries to conserve natural, historic, scenic, and recreational resource values; however, designations also can encourage other resource uses in particular areas (e.g., sightseeing, scientific study). The impacts on resources and resource uses of designating lands as special designations and establishing MAs in the planning area are described in this section.

4.7.1 Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas

This section presents an analysis of management actions involving 12 proposed or existing special designations (10 ACECs and 2 RNAs) within the planning area (Table 4-13). In general, alternatives differ by whether they designate areas under special designations or not and how many. In addition, alternatives differ by the type of proposed special designation or whether the area is proposed as an MA. This section is organized in the same order of the special designation section in Chapter 3. The special designation analysis, unlike the other analyses in this chapter, considers the impacts of special designations or identification of other management on other resources and resource uses within the planning area rather than focuses on how alternatives impact a single resource program. This analysis is based on the following assumptions: (1) special designations are established and managed in a manner to protect specific resource values within their boundaries; therefore, resources not specifically protected may be impacted by these designations, and (2) analysis of the impacts to resources and resource uses from special designations and establishment of MAs is necessary to clarify management choices between alternatives.

The impact analysis considers impacts from the administrative action of designating lands or of identifying other management for lands within the planning area. In addition, the impact analysis considers implementing a management plan for each designation or MA. However, at this time, general assumptions are used because, with the exception of the Raymond Mountain ACEC and WSA, detailed management plans and implementation programs for specific areas are not available. Management actions associated with each alternative are the basis for the impact analyses that follow. Where appropriate, uncertainties (i.e., a lack of available data or incomplete information) are identified.

The following discussions are limited to important considerations and impact findings as compared with the existing conditions in the planning area. If a potential impact is (1) virtually identical for all alternatives, (2) inconsequential, or (3) otherwise minor relative to other issues, it is either noted for clarification or not mentioned. This approach to the analysis avoids presenting redundant and unnecessary discussions. In general, each analysis covers a selected set of environmental disciplines and generally presents the issues in order of importance.

Table 4-13. Proposed and Existing Special Designations and MAs by Alternative

Name	Alternative			
	A	B	C	D *(Preferred Alternative)*
Existing ACEC				
Raymond Mountain	ACEC	ACEC	--	ACEC
Proposed ACECs/RNAs/MAs				
Raymond Mountain Expansion	--	ACEC	--	--
Special Status Plant Species Habitat	--	ACEC/RNA	--	ACEC/CBC
Cushion Plant Communities	--	ACEC/RNA	--	ACEC/CBC
Bridger Butte	--	ACEC	--	ACEC
White-tailed Prairie Dog Complexes	--	ACEC	--	--
Dry Fork Watershed	--	ACEC	--	--
Upper Tributary Watershed	--	ACEC	--	--
Lower Tributary Watershed	--	ACEC	--	--
Fossil Basin	--	ACEC/MA	--	--
Rock Creek/Tunp	--	MA	--	MA
Bear River Divide	--	MA	--	MA
Determined Suitable for Inclusion in the National WSR System				
Bear River	--	WSR	--	--
Blacks Fork River	--	WSR	--	--
Bridger Creek Unit	--	WSR	--	--
Coal Creek	--	WSR	--	--
Dempsey Creek	--	WSR	--	--
Emigrant Creek	--	WSR	--	--
Fontenelle Creek	--	WSR	--	--
Hams Fork	--	WSR	--	--
Huff Creek	--	WSR	--	WSR
Pine Creek Unit	--	WSR	--	--
Raymond Creek Unit	--	WSR	--	WSR
Slate Creek	--	WSR	--	--
Smiths Fork River	--	WSR	--	--
Proposed WSA				
Raymond Mountain (as proposed to Congress)	WSA	WSA	WSA	WSA
Raymond Mountain (If Congress does not designate it as wilderness)	--	WSA	--	WSA
Proposed Back Country Byway				
Emigrant Springs	--	BCB	--	BCB

--	No special designation under this alternative	RNA	Research Natural Area
ACEC	Area of Critical Environmental Concern	MA	Management Area
BCB	Back Country Byway	WSA	Wilderness Study Area
CBC	Habitat would be designated on a case-by-case basis	WSR	Wild and Scenic River

Raymond Mountain ACEC

Maintaining and enhancing Bonneville cutthroat trout habitats is the primary objective of designating the 12,667-acre Raymond Mountain ACEC. The existing Raymond Mountain ACEC is managed in accordance with the *Raymond Mountain ACEC Management Plan* (BLM 1982).

4.7.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts associated with retaining or not retaining the Raymond Mountain ACEC designation and the proposed expansion of the ACEC vary by alternative, as described below.

Alternative A

The 12,667-acre Raymond Mountain ACEC is retained at its current size under Alternative A and managed in accordance with the *Raymond Mountain ACEC Management Plan* (BLM 1982) (see Map 61). There are no existing oil and gas leases in the Raymond Mountain ACEC; thus, constraints on oil and gas development are expected to have negligible adverse impact. The existing Raymond Mountain ACEC, which is located wholly within the Raymond Mountain WSA, is also withheld from mineral leasing. Likewise, the prohibition on coal development is expected to have a negligible adverse impact due to the low occurrence potential for coal within the Raymond Mountain ACEC. The prohibition on phosphate leasing within the Raymond Mountain ACEC will prevent extraction in the area classified as moderate phosphate occurrence potential. Trona leasing is also prohibited within the Raymond Mountain ACEC; however, the occurrence potential of trona in this area is low.

Management to protect the Bonneville cutthroat trout and its habitats within the Raymond Mountain ACEC is anticipated to continue under Alternative A. Avoidance of surface-disturbing activities and prohibition of motor vehicles within the ACEC protect soil from erosion, limit opportunities for the spread of INNS, and maintain or enhance water quality and riparian habitats. These constraints directly benefit Bonneville cutthroat trout habitats and indirectly benefit terrestrial wildlife and vegetation communities associated with riparian and aquatic habitats. Constraints on livestock grazing within the ACEC benefit the Bonneville cutthroat trout by conserving riparian vegetation and aquatic habitats; however, these constraints are considered adverse to livestock grazing because they reduce grazing opportunities in the area. Similarly, the prohibition of motor vehicle use in the ACEC protects natural resource values; however, this constraint adversely impacts OHV and snow machine use because it restricts opportunities for users.

Alternative B

Under Alternative B, the existing Raymond Mountain ACEC is retained and expanded by 27,026 acres of BLM-administered surface (see Map 62). The proposed expansion will provide additional protection to the Bonneville cutthroat trout. Adverse and beneficial impacts to resources and resource uses described under Alternative A are expected to increase under Alternative B due to the expanded area subject to constraints; however, the types of impacts are not expected to vary. For example, the development and occurrence potential for minerals within the expansion area are low to moderate, similar to mineral potential within the existing ACEC. Therefore, in general, adverse impacts to minerals, livestock grazing, and motor vehicle use and beneficial impacts to natural resources will increase under Alternative B compared to Alternative A in proportion to the expansion area.

Alternative C

Under Alternative C, the Raymond Mountain ACEC designation is removed and the ACEC expansion is not implemented (see Map 63). The area's location within the Raymond Mountain WSA is expected to result in similar benefits to natural resources and similar constraints to minerals, livestock grazing, and motor vehicle use as described under Alternative A (see the WSA section). In other words, despite removing the Raymond Mountain ACEC designation, most of the constraints intended to limit resource uses and protect resource values would remain because the area is within the Raymond Mountain WSA.

Alternative D (Preferred Alternative)

Under Alternative D, the Raymond Mountain ACEC is retained; however, the expansion is not implemented (see Map 64). Therefore, under Alternative D, benefits to natural resources and constraints to minerals, livestock grazing, and motor vehicle use are expected to be the same as described under Alternative A.

4.7.1.3 Conclusion

Because the Raymond Mountain ACEC is encompassed within the Raymond Mountain WSA, some resource protection and constraints on resource uses associated with the ACEC designation are redundant. Therefore, removal of the ACEC designation under Alternative C is not expected to substantively and adversely impact the Bonneville cutthroat trout or other natural resources. Nor is the removal of the ACEC under Alternative C expected to result in substantive mineral development within the ACEC boundary. Conversely, expansion of the Raymond Mountain ACEC under Alternative B provides added protection to habitats for the Bonneville cutthroat trout, thereby benefiting this species more compared to all other alternatives. Overall, Alternative B provides more benefits to the Bonneville cutthroat trout and other natural resources and constrains mineral development, livestock grazing, and motor vehicle use more compared to all other alternatives.

Special Status Plant Species Habitat ACEC/RNA (Proposed)

Maintaining, stimulating, and supporting reestablishment of special status plant species habitats are the primary objectives for designating the 907-acre ACEC, of which 774 acres are BLM-administered surface and 793 acres are federal mineral estate. Special status plant species documented as occurring within the planning area are listed in Table 3-18.

4.7.1.4 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- Surface-disturbing or other disruptive activities, including ROW, in special status plant habitats adversely impact special status plant species.
- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown, and could underestimate the potential impact of surface disturbance on special status plant populations.
- Reclamation of surface disturbance and reestablishment of vegetation minimizes adverse impacts to soils and, therefore, to special status plant species habitats. The sooner the reestablishment of vegetation occurs, the greater the benefit to special status plant species.
- Management actions associated with protecting wildlife and cultural resource values generally benefit or have no adverse impact on special status plant species.

4.7.1.5 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats for, populations of, and individual special status plants can be impacted by surface-disturbing activities, such as mineral exploration and development, construction associated with communication or alternative energy (e.g., wind-energy) sites, and construction of roads, pipelines, and other linear features. Other activities that remove vegetation, disturb soil, and (or) provide opportunity for INNS plants to spread and adversely impact habitats for special status plant species include concentrated livestock and native ungulate grazing, intensive recreational use, OHV use, and human plant collection. Grazing (both livestock and wildlife) may provide both adverse and beneficial impacts to special status plant species, depending on grazing intensity, timing and (or) season of grazing, range conditions, and precipitation regimes. Impacts associated with designating or not designating special status plant species' habitats as ACECs/RNAs are described for each alternative.

Alternative A

Under Alternative A, no areas of special status plant species' habitats are designated as ACECs; however, four populations of *Physaria dornii* and a representative cushion plant community in the planning area continue to be protected by an NSO restriction for fluid minerals. In addition, areas where special status plants are known to exist continue to be ROW avoidance areas under Alternative A. Under Alternative A, the use of fire-suppression chemicals and livestock salt or mineral supplements and range improvements are not allowed in special status plant species' habitats. In addition, chemicals must be mixed a minimum of 500 feet away from known special status plant species' habitats according to the *Standard Operating Procedures for Range Improvements and Vegetation Manipulations*. These restrictions within special status plant species' habitats will continue to benefit special status plant species and continue to restrict other resource uses under Alternative A.

Motor vehicle use is not limited in special status plant species' habitats under Alternative A and could adversely impact these species. Disturbances associated with vehicle traffic include contributing dust to the air and on vegetation, crushing vegetation, increasing soil erosion, and (or) providing opportunity for the spread of INNS.

Mineral material sales and (or) free use permits can be authorized on a case-by-case basis in special status plant species habitats; however, the majority of the areas where special status plant species habitats are known to exist exhibit low or moderate oil- and gas-development potential, low-to-moderate phosphate potential, and low coal and trona potential. Under Alternative A, potential habitat areas of special status plant species are areas of CSU for surface-disturbing activities.

Potential habitats of special status plant species on federal or split-estate lands currently require searches for these plant species prior to approval of any project or activity. Should special status plant species be found, all disruptive activities are halted until species-specific protective measures are developed and implemented. Measures to protect special status plants are applied to all actions and use authorizations and include avoidance, NSO for fluid minerals, and no surface disturbance. For federally listed species, protective measures are developed and implemented in coordination with the USFWS.

Alternative B

Under Alternative B, 774 acres of BLM-administered surface and 793 acres of federal mineral estate of special status plant species' habitats are designated as ACECs and populations as RNAs (Map 62). Already proposed under Alternative B without designation as an ACEC or RNA, all known locations of special status plant species are considered ROW exclusion areas and are closed to adverse surface-disturbing activities, mining claim location, mineral materials sale and (or) free use permits, off-road vehicle use, and the use of salt or mineral supplements or range improvements within ½ mile of special status species plant populations. Potential habitats of special status plant species on federal or split-estate

lands require searches for these special status plant species prior to approving any project or activity. Should special status plant species be found, all disruptive activities are halted. See the Special Status Species-Plants section.

In addition, without designation as an ACEC or RNA, Alternative B closes the area from sodium and phosphate leasable minerals in special status plant species' habitats within the planning area. Closure of these areas under Alternative B, restricts mineral development more and provides more protection to these habitats compared to Alternative A.

Designating special status plant species habitats as ACECs and populations as RNAs under Alternative B provides additional protection to special status plant species to the existing constraints described under their current management (Alternative A). Under ACEC/RNA designations, more emphasis would be on protection, prevention of damage to resources, biological diversity, and scientific study and education (see Special Designations in Chapter 3). However, ACEC and RNA designation of special status species are not anticipated to substantively add to existing or proposed constraints on resource uses under Alternative B. Current and proposed restrictions on mineral leasing under Alternative B affect areas with moderate or low oil- and gas-development potential, low coal- and trona-occurrence potential, and moderate phosphate-occurrence potential in the proposed ACEC/RNA areas.

Alternative C

Under Alternative C, no areas of special status plant species' habitats are designated as ACECs and no populations as RNAs. Impacts from not designating the special status plant species habitats as ACECs and populations as RNAs under Alternative C are the same as described under Alternative A. However, the NSO restriction for fluid minerals on *Physaria dornii* populations, the limitations on surface-disturbing activities, and the requirements for plant surveys would be removed, as described in the Special Status Plants section.

Alternative D (Preferred Alternative)

Under Alternative D, 774 acres of BLM-administered surface and 793 acres of federal mineral estate of special status plant species habitats can be designated as an ACEC on a case-by-case basis (Map 64). Special status plant populations that are ACECs are not designated as RNAs. Due to existing and proposed constraints on resource uses intended to protect special status plant species, the impacts of designating habitats for these species as ACECs are not expected to result in substantive additional protection for these species or substantive additional constraints on resource uses compared to Alternative A.

4.7.1.6 Conclusion

Based on existing and proposed constraints on resource uses intended to protect special status plant species, designating habitats for these species as ACECs or populations as RNAs may add some protections for the species, but are not expected to substantively further constrain resource uses. Analysis of the impacts of management actions specific to special status species, but not included as part of the ACEC/RNA designation, is discussed in the Special Status Species – Plants section of this chapter.

Cushion Plant Communities ACEC/RNA (Proposed)

Maintaining and enhancing cushion plant communities is the primary objective for designating the 62-acre ACEC and (or) RNA. Seven endemic species have been documented as occurring within the planning area (maps 62 and 64).

4.7.1.7 Methods and Assumptions

Methods and assumptions used in this impact analysis are the same as those described under special status plant species habitats ACEC/RNA description.

4.7.1.8 Analysis of Alternatives

Impacts Common to All Alternatives

Cushion plant communities can be impacted by surface-disturbing activities, such as mineral exploration and development, construction associated with communication or alternative energy (e.g., wind-energy) sites, and construction of roads, pipelines, and other linear features. Other activities that remove vegetation, disturb soil, and (or) provide opportunity for INNS plants to spread and thus, potentially adversely impact cushion plant communities, include concentrated livestock and native ungulate grazing, intensive recreational use, OHV use, and human plant collection. Impacts associated with designating or not designating cushion plant communities as an ACEC/RNA are described for each alternative.

Alternative A

Under Alternative A, cushion plant communities are not designated as an ACEC and (or) RNA. A cushion plant community currently protected from oil and gas leasing with an NSO restriction on fluid minerals represents less than 1 percent of the known occupied habitat mapped by the Wyoming Natural Diversity Database (WYNDD) (refer to Chapter 3, Special Status Plants). Under Alternative A, not designating additional cushion plant communities as ACECs and (or) RNAs may not fully protect the viability of cushion plant communities in the planning area.

Alternative B

Under Alternative B, 62 acres of cushion plant community are designated as an ACEC and RNA (Map 62). Proposed management actions under Alternative B, not associated with the cushion plant community ACEC/RNA designation, prohibit surface-disturbing activities and surface disturbance of any nature or for any purpose other than for protection or enhancement of the species on known locations of special status plants. Designating cushion plant communities as ACECs and RNAs under Alternative B would place more emphasis on protection, prevention of damage to resources, biological diversity, and scientific study and education in these habitats, but should not increase constraints on resource uses in these communities.

Alternative C

Under Alternative C, cushion plant communities are not designated as ACECs and (or) RNAs, and the NSO restriction for fluid minerals described under Alternative A is removed. Impacts from not designating cushion plant communities as ACECs and RNAs are greater under Alternative C compared to Alternative A due to the removal of the NSO restriction for fluid minerals under Alternative C and the addition of no protected areas. The result is less protection for cushion plant communities and potential threats to viability of the population as a whole.

Alternative D (Preferred Alternative)

Under Alternative D, up to 62 acres of cushion plant communities may be designated as an ACEC on a case-by-case basis, in addition to the representative cushion plant communities protected with an NSO restriction for fluid minerals (Map 64). Cushion plant communities designated as an ACEC are not designated as an RNA. In addition to the NSO restriction for fluid minerals, the impacts from designating cushion plant communities as an ACEC under Alternative D add some protection to sensitive plant habitats, while not providing substantial additional constraints on resource uses.

4.7.1.9 Conclusion

Due to existing or proposed management action constraints under alternatives B and D, designation of cushion plan communities as an ACEC or RNA may increase protection for the species, but would not add substantial constraints on resource uses over Alternative A. Under Alternative C, removal of the NSO restriction for fluid minerals in a currently protected cushion plant community could adversely

impact cushion plant communities, but may be beneficial to resource uses compared to all other alternatives.

Bridger Butte ACEC (Proposed)

Protecting, preserving, and enhancing cultural, historical, and Native American values, as well as rare plant species that exist in the area, are the primary objectives for designating the Bridger Butte ACEC (see maps 62 and 64).

4.7.1.10 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future development in Bridger Butte will require ROW for roads, pipelines, and possibly powerlines. Specific placement of these ancillary facilities will be guided by compliance with Section 106 of the NHPA and planned to minimize visual intrusions. Restrictions on placing ROW in the Periphery Area will be project-specific.
- Leases within the Bridger Butte contain various stipulations concerning surface disturbance, surface occupancy, and limited surface use. In addition, the lease stipulations provide that the U.S. Department of the Interior may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may be required to protect the surface of the leased lands and the environment." None of the stipulations, however, would empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

4.7.1.11 Analysis of Alternatives

Impacts Common to All Alternatives

In general, land use authorizations that include surface disturbance can physically disrupt the archeological component of an area with subsequent loss of valuable scientific data. Further, increased activity compromises traditional cultural values, such as tranquility and isolation, which are important to Native Americans. Increased development in Bridger Butte could further diminish the suitability of the area for ceremonial purposes. The various alternatives define how land use activities are balanced against scientific and traditional values. Because not all alternatives designate Bridger Butte as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Bridger Butte area is not designated as an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 1,127 acres of BLM-administered surface are designated as the Bridger Butte ACEC (Map 62). The area is an exclusion area for ROW corridors, wind-energy projects, and other surface-disturbing activities; is closed to OHV use; and is excluded from prescribed fires and vegetation treatments on BLM-administered lands within the ACEC boundary. The restrictions on resource uses associated with this ACEC designation will provide more protection to cultural, historical, and Native American values compared to all other alternatives. However, these restrictions will adversely impact wind energy, mineral development, and OHV use. Prohibiting use of prescribed fires and vegetation treatments also could have an adverse impact on natural resources by limiting the flexibility of BLM managers to improve existing plant communities in the area. Wind-energy occurrence in the proposed ACEC is classified as moderate to high. Oil- and-gas development potential and coal- and trona-occurrence potential in the area are classified as low. Phosphate occurrence potential in the area is moderate. Due to the relatively small size (1,127 acres) and the overall mineral development and

occurrence potential of the proposed area, adverse impacts to wind-energy and mineral development are not expected to be substantial; however, they are expected to be more under Alternative B than under all other alternatives.

Alternative C

Under Alternative C, Bridger Butte is not designated as an ACEC. Beneficial and adverse impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, 727 acres of BLM-administered surface are designated as the Bridger Butte ACEC (Map 64). Impact types under Alternative D are the same as those described under Alternative B; however, the intensity of impacts is expected to be slightly less due to the smaller size of the proposed ACEC under Alternative D. Under Alternative D, the benefits to cultural, historical, Native American values, and rare plant species from designating the ACEC are greater compared to alternatives A and C. Likewise, the adverse impacts to resource uses are more under Alternative D compared to alternatives A and C.

4.7.1.12 Conclusion

Alternatives A and C include the fewest restrictions and, therefore, provide the least adverse impact to other resource uses compared to other alternatives. Conversely, alternatives A and C provide the least protection for cultural, historical, and Native American values compared to other alternatives. Due to the difference in ACEC acres proposed, Alternative B provides the most benefit to cultural, historical, and Native American values and the most adverse impacts to wind energy, mineral development, and OHV use compared to all alternatives, followed by Alternative D.

White-tailed Prairie Dog ACEC (Proposed)

Maintaining and ensuring a self-sustaining population of the white-tailed prairie dogs by managing to preserve white-tailed prairie dog colonies, complexes, and associated habitats is the primary objective for designating the 30,913-acre ACEC (see Map 62).

4.7.1.13 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.14 Analysis of Impacts

Impacts Common to All Alternatives

Contiguous wildlife habitats can be adversely impacted by activities, such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate white-tailed prairie dog complexes as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, white-tailed prairie dog complexes are not designated as an ACEC and resource uses, such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the complexes in accordance with current management.

Alternative B

Under Alternative B, 30,913 acres of BLM-administered surface and 28,739 acres of federal mineral estate of white-tailed prairie dog complexes more than 100 acres in size are designated ACECs and

protected with restrictions on surface-disturbing activities (Map 62). Designation of the white-tailed prairie dog complexes ACECs under Alternative B is anticipated to protect habitats from surface-disturbing activities and thereby benefit the resident white-tailed prairie dogs and associated wildlife species more compared to Alternative A. Designating ACECs for white-tailed prairie dog complexes that encompass private land ownership may adversely impact private landowners who own or manage livestock within the ACEC. Prairie dogs reduce vegetation and, therefore, affect forage used by livestock.

In addition, the proposed ACEC under Alternative B will prohibit mineral development. However, since most of the proposed ACEC area is classified as low-to-moderate oil- and gas-development potential, and low occurrence potential for coal, phosphate, and trona, the designation under Alternative B is not expected to substantively and adversely restrict mineral development.

Alternative C

Under Alternative C, white-tailed prairie dog complexes are not designated as ACECs. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, white-tailed prairie dog complexes are not designated as ACECs. Impacts are the same as those described under Alternative A.

4.7.1.15 Conclusion

Only Alternative B designates white-tailed prairie dog complexes as ACECs. This designation would be beneficial to white-tailed prairie dogs, as well as associated wildlife species, and may adversely impact mineral development, although not substantially. Alternatives A, C, and D do not designate white-tailed prairie dog complexes as ACECs and are, therefore, not expected to have any additional benefits to white-tailed prairie dogs or adverse impacts to mineral development.

Dry Fork Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats are the primary objectives for designating the 4,690-acre Dry Fork Watershed ACEC. The Dry Fork Watershed provides yearlong habitats for all life stages of the core conservation populations of the Bonneville cutthroat trout and other native nongame aquatic species (see Map 62).

4.7.1.16 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.17 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Dry Fork Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Dry Fork Watershed is not designated as an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 3,172 acres of BLM-administered surface and 4,054 acres of federal mineral estate are designated as the Dry Fork Watershed ACEC (Map 62). Designating the Dry Fork Watershed ACEC will limit access for and adversely impact livestock grazing, mineral development activities, OHV use, and recreation. These restrictions are anticipated to reduce soil erosion, maintain or enhance riparian and other vegetation communities, and maintain or enhance aquatic habitats for the Bonneville cutthroat trout and leatherside chub. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Dry Fork Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the Dry Fork Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.18 Conclusion

Only Alternative B designates the Dry Fork Watershed as an ACEC. This designation is expected to protect the area from disturbance and therefore benefit the Bonneville cutthroat trout and riparian habitats in the area. In addition, the proposed ACEC may adversely impact mineral-development activities, livestock grazing, OHV use, and recreation by restricting these resource uses on a relatively small acreage. Alternatives A, C, and D do not designate the Dry Fork Watershed an ACEC and are therefore not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Upper Tributary Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats are the primary objectives for designating the 5,595-acre Upper Tributary Watershed ACEC (see Map 62).

4.7.1.19 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.20 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Upper Tributary Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Upper Tributary Watershed is not designated an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 4,291 acres of BLM-administered surface and 4,924 acres of federal mineral estate are designated as the Upper Tributary Watershed ACEC. Benefits from designating the Upper Tributary Watershed ACEC under Alternative B include protecting the Bonneville cutthroat trout, leatherside chub, and riparian habitats in the area. Potential adverse impacts from designating the Upper Tributary Watershed ACEC include restrictions on livestock grazing, mineral-development activities, OHV use, and recreation. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Upper Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the Upper Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.21 Conclusion

Only Alternative B designates the Upper Tributary Watershed an ACEC. This designation is expected to benefit the Bonneville cutthroat trout, leatherside chub, and riparian areas, and have negligible adverse impacts on mineral-development activities, livestock grazing, OHV use, and recreation because of the relatively small acreage. Alternatives A, C, and D do not designate the Upper Tributary Watershed an ACEC and, therefore, are not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Lower Tributary Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats is the primary objective for designating the 1,371-acre Lower Tributary Watershed ACEC (see Map 62).

4.7.1.22 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.23 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities, such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Lower Tributary Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Lower Tributary Watershed is not designated an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 1,351 acres of BLM-administered surface and 1,359 acres of federal mineral estate are designated the Lower Tributary Watershed ACEC. Benefits from designating the Lower Tributary

Watershed ACEC under Alternative B include protecting Bonneville cutthroat trout and leatherside chub habitats. Potential adverse impacts from designating the Lower Tributary Watershed ACEC include limited access to the area for livestock grazing, mineral-development activities, OHV use, and recreation. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Lower Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the Lower Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.24 Conclusion

Only Alternative B designates the Lower Tributary Watershed an ACEC. This designation is anticipated to benefit the Bonneville cutthroat trout and leatherside chub habitats and have negligible adverse impacts on mineral development activities, livestock grazing, OHV use, and recreation because of the relatively small acreage. Alternative A, C, and D do not designate the Lower Tributary Watershed an ACEC and, therefore, are not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Fossil Basin ACEC/MA (Proposed)

Protecting fossil resources is the primary objective for designating the 451,452-acre Fossil Basin as an ACEC or establishing the area as an MA (see Map 62).

4.7.1.25 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Direct impacts to paleontological resources from designating or not designating the Fossil Basin ACEC, or establishing the area as an MA will typically result from actions that physically alter, damage, or destroy fossils or their contexts. For example, any type of surface disturbance in an area containing fossil resources could have a direct impact by disturbing important paleontological values. These actions also may have an indirect impact by providing greater access to the area, which can bring increased vandalism, removal of materials, and inadvertent damage that could impact fossils or their contexts. Conversely, actions that result in data collection and preservation of paleontological resources can be considered beneficial impacts.
- Scientifically important fossils will continue to be found within the ACEC/MA.
- Adverse impacts to paleontological resources occur from physical damage or destruction of fossils, from loss of related scientific data, and from transfer from public ownership.
- Adverse impacts to paleontological resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, it is valid to use the projected numbers for short-term surface disturbance to quantify impacts to paleontological resources. Erosion resulting from long-term surface disturbance, or from naturally occurring climatic events, can adversely impact paleontological resources, but not to the extent of short-term surface disturbance.
- In some cases, surface-disturbing activities require paleontological surveys prior to impacts occurring. These surveys, and monitoring of construction, sometimes result in identifying

information about the resource that would otherwise be unavailable, and also result in the collection and curation of fossils for further research. In these cases, surface-disturbing activities can provide a benefit to the resource.

4.7.1.26 Analysis of Alternative

Impacts Common to All Alternatives

Impacts to paleontological resources from surface-disturbing activities, visitor accessibility, OHV use, and proactive paleontological resource management actions are described under the individual alternatives because not all alternatives designate the Fossil Basin as an ACEC or establish the area as an MA.

Alternative A

Under Alternative A, the Fossil Basin area is not designated as an ACEC and the area is not established as an MA. Under Alternative A, resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management. Potential adverse impacts to fossil resources would result from surface-disturbing activities associated with these resource uses, and be greater than those under Alternative B.

Alternative B

Under Alternative B, 201,660 acres of BLM-administered surface and 250,146 acres of federal mineral estate are designated the Fossil Basin ACEC or established as an MA (Map 62). Anticipated benefits under Alternative B include greater preservation and protection of the fossil resources in the area, compared to other alternatives. Potential adverse impacts from designating the Fossil Basin ACEC or establishing the area as an MA include restricting other resource uses in the area. The proposed area is a mixture of low, moderate, and high oil- and gas-development potential; low occurrence potential for coal; and low, moderate, and high occurrence potential for phosphate. The relatively large size of the proposed area and occurrence and development potential of minerals could adversely impact mineral development.

Alternative C

Under Alternative C, the Fossil Basin area is not designated as an ACEC and (or) established as an MA. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the Fossil Basin area is not designated as an ACEC and (or) established as an MA. Impacts are the same as those described under Alternative A.

4.7.1.27 Conclusion

Only Alternative B designates the Fossil Basin as an ACEC or establishes the area as an MA. This designation provides more benefit to fossil resources in the area compared to other alternatives; however, it is expected to adversely impact resource uses requiring surface-disturbing activities, such as mineral development. Alternatives A, C, and D provide less protection for fossils in Fossil Basin than Alternative B.

Rock Creek/Tunp MA (Proposed)

Protecting and enhancing critical wildlife habitats and cultural resources are the primary objectives for establishing the Rock Creek/Tunp MA (see maps 62 and 64).

4.7.1.28 Methods and Assumptions

Because the objective of this designation is to protect multiple, sensitive overlapping resources, methods and assumptions for this impact analysis are the same as those listed under the specific resource sections in this chapter.

4.7.1.29 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives establish the Rock Creek/Tunp MA, impacts are described for each alternative.

Alternative A

Under Alternative A, the Rock Creek/Tunp MA is not established. Under Alternative A, resource uses, such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 63,278 acres of BLM-administered surface and federal mineral estate are established for the Rock Creek/Tunp MA (Map 62). Under Alternative B, the Rock Creek/Tunp MA includes specific management actions to protect wildlife and cultural resource values, including making the area administratively unavailable for all new mineral lease considerations; prohibiting mineral material sales and (or) free use permits; pursuing mineral withdrawals for locatable minerals; restricting new ROW actions to existing utility corridors; prohibiting new road developments, surface disturbance, high-profile structures, and wind-power facilities; pursuing reclamation of select existing roads; restricting OHV use to open roads and off-trail travel without prior approval from the authorized officer; retaining existing character of the landscape for NHTs and site settings; maintaining existing federal active AUMs; restricting placement of salt licks and mineral supplements; controlling and eradicating noxious weeds; and maintaining plant community and wildlife habitat needs. Management actions restricting resource uses within the proposed area are anticipated to increase protection of sensitive overlapping wildlife habitats and cultural resources, compared to Alternative A. Conversely, these same restrictions are anticipated to adversely impact wind-energy and mineral development, livestock grazing, and OHV use. Given the relatively small size of the proposed MA and the fact that the area is classified as having low oil- and gas-development potential, low coal- and trona-occurrence potential, and moderate phosphate occurrence potential, adverse impacts to mineral development are not expected to be substantial.

Alternative C

Under alternative C, the Rock Creek/Tunp MA is not established. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, 45,863 acres of BLM-administered surface and federal mineral estate are established as the Rock Creek/Tunp MA (Map 64). In addition to establishing a smaller area under Alternative D compared to Alternative B, the management actions intended to protect wildlife and cultural resource values are more flexible under Alternative D, including making the area administratively unavailable for all new fluid mineral lease considerations (expired leases are not reissued); restricting all new ROW actions to existing disturbance zones; authorizing no wind-power facilities; allowing no net loss of habitat function from any construction activity within the boundaries of the management area (habitat restoration could offset disturbances); restricting OHV use to existing roads and trails (allowing no off-trail travel without prior approval from the authorized officer); allowing no salt licks or mineral

supplements within ¼ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and cultural sites that are eligible for or listed on the NRHP; and developing plant community objectives and continuing to implement appropriate management to meet and maintain wildlife habitat needs. The area is administratively unavailable for solid leasable minerals; however, the area is administratively available for mineral materials use and (or) free use permits and available for locatable mineral entry. Forage associated with newly acquired federal lands is available for livestock use under Alternative D. INNS are managed according to Partners Against Weeds. Therefore, the types of impacts caused by establishing the Rock Creek/Tunp MA under Alternative D are similar to those described under Alternative B; however, the intensity of beneficial and adverse impacts are less under Alternative D due to the smaller size of the MA and more flexibility in management actions.

4.7.1.30 Conclusion

Alternatives A and C do not identify the Rock Creek/Tunp as an MA and, therefore, these alternatives are not anticipated to benefit wildlife and cultural resource values or to adversely impact resource uses in the proposed MA. Alternative B establishes more acres as the Rock Creek/Tunp MA and includes more constraining prescriptions intended to protect wildlife and cultural resource values compared to Alternative D. Alternative B is anticipated to result in the most benefits to wildlife and cultural resource values and the most adverse impact to resource uses compared to all alternatives. Alternative D establishes a smaller area for the proposed MA and provides more flexibility in management actions to protect resource uses, resulting in less adverse impact compared to Alternative B and more benefits to resource values compared to alternatives A and C.

Bear River Divide MA (Proposed)

Protecting and enhancing critical wildlife habitats, cultural resources, and paleontological resources are the primary objectives for establishing the Bear River Divide MA (see maps 62 and 64).

4.7.1.31 Methods and Assumptions

Because the objective of this establishment is to protect multiple, sensitive overlapping resources, methods and assumptions for this impact analysis are the same as those listed under the specific resource sections in this chapter.

4.7.1.32 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives establish the Bear River Divide MA, impacts are described for each alternative.

Alternative A

Under Alternative A, the Bear River Divide is not established as an MA. Under Alternative A, resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 146,322 acres of BLM-administered surface and 147,156 acres of federal mineral estate are established as the Bear River Divide MA (Map 62). Under Alternative B, the Bear River Divide MA includes specific management actions to protect wildlife, cultural, and paleontological resource values, including making the area administratively unavailable for all new mineral lease considerations; prohibiting mineral material sales and (or) free use permits; pursuing mineral withdrawals for locatable minerals; restricting new ROW actions to existing utility corridors; prohibiting new road developments, surface disturbance, high-profile structures, and wind-power facilities; pursuing reclamation of select

existing roads; restricting OHV use to open roads and off-trail travel without prior approval from the authorized officer; retaining existing character of the landscape for NHTs and site settings; maintaining existing federal active AUMs; restricting placement of salt licks and mineral supplements; controlling and eradicating noxious weeds; maintaining plant community and wildlife habitat needs; and studying and protecting important paleontological resources in the Fossil Basin area. Management actions restricting resource uses within the proposed area are anticipated to increase protection of wildlife habitats and cultural and paleontological resources compared to Alternative A. Conversely, these same restrictions are anticipated to adversely impact wind-energy and mineral development, livestock grazing, and OHV use. Given the size of the proposed MA and the fact that the area is classified as low to high for oil- and gas-development potential, low to moderate for coal- and phosphate-occurrence potential, adverse impacts to mineral development are expected under Alternative B.

Alternative C

Under Alternative C, the Bear River Divide area is not established as an MA. Impacts are the same as those under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, 74,954 acres of BLM-administered surface and 74,258 acres of federal mineral estate are identified as the Bear River Divide MA (Map 64). In addition to identifying a smaller area under Alternative D, the management actions intended to protect wildlife and cultural, resource values are more flexible compared to Alternative B, and no other management actions are identified for paleontological resource values under Alternative D. Therefore, the types of impacts caused by identifying the Bear River Divide MA under Alternative D are similar to those described under Alternative B; however, the intensity of beneficial and adverse impacts are less under Alternative D due to the smaller size area and greater flexibility in management actions.

4.7.1.33 Conclusion

Alternatives A and C do not identify the Bear River Divide as an MA and, therefore, these alternatives are not anticipated to benefit wildlife, cultural, and paleontological resource values or to adversely impact other resource uses in the proposed MA. Alternative B establishes more acres as the Bear River Divide MA and includes more constraining prescriptions intended to protect wildlife, cultural, and paleontological resource values compared to Alternative D. Alternative B is anticipated to result in the most benefits to wildlife, cultural, and paleontological resource values and the most adverse impact to other resource uses compared to all alternatives. Alternative D establishes a smaller area for the proposed MA and provides more flexibility in management actions to protect resource values, resulting in less adverse impact compared to Alternative B, but does not provide additional benefits to paleontological resource values. However, more benefits to wildlife and cultural resource values may occur under Alternative D compared to alternatives A and C.

4.7.2 Wild and Scenic Rivers

Protecting and enhancing scenic qualities, fisheries, recreation, and wildlife values, and the relatively unmodified character of the area in a near-natural setting, are the primary objectives for considering up to 13 waterway segments as suitable for inclusion in the WSR system (see maps 62 and 64). Any rivers that are not determined suitable for inclusion in the WSR system would continue to be managed in the same manner as waterways on the adjacent BLM lands.

4.7.2.1 Methods and Assumptions

Methods and assumptions used in this analysis are identified at the beginning of Chapter 4.

4.7.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives identify the WSRs, impacts are described for each alternative.

Alternative A

Under Alternative A, 13 eligible waterway segments are managed to protect the free-flowing values and tentative classification of these segments as WSRs; however, none of the segments is designated for suitability or nonsuitability as a WSR. Resource use of these areas is reviewed on a case-by-case basis and applicable protective management is applied, subject to valid existing rights. For waterway segments currently located in the Raymond Mountain WSA, impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as the segments that lie within the Raymond Mountain WSA are already managed under the *Interim Management Policy and Guideline for Lands Under Wilderness Review: Update Document H-8550, 11/10/87* (IMP) (BLM 1995a).

Alternative B

Under Alternative B, all 13 waterway segments are recommended suitable for inclusion in the National Wild and Scenic Rivers system. Based on GIS analysis of waterway segments, Alternative B would have the greatest adverse impact to resource uses in the areas of these waterway segments of all alternatives, as management would focus on protecting the waterway segments. Specific management for each segment is based on a case-by-case review. For segments currently located in the Raymond Mountain WSA (including Huff Creek and Raymond Creek), impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as this area is managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation.

Alternative C

Under Alternative C, none of the 13 waterway segments are recommended suitable for inclusion in the National Wild and Scenic Rivers system. Alternative C would have the least adverse impacts to resources uses, as this alternative would have the least protective measures for these waterway segments. These areas would be managed the same as adjacent federal lands. For segments currently located in the Raymond Mountain WSA (including Huff Creek and Raymond Creek), impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as this area is managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation.

Alternative D (Preferred Alternative)

Alternative D recommends two waterway segments (Huff Creek and Raymond Creek) suitable for inclusion in the National Wild and Scenic Rivers system. Impacts from designating these two waterway segments as suitable for inclusion in the WSR system under Alternative D are the same as those described under Alternative A of the Raymond Mountain WSA, as most of these creeks lie within the Raymond Mountain WSA and the area is already managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation. Management of these segments would protect the values for which the segments were designated.

4.7.2.3 Conclusion

Alternative B would provide the most benefit to scenic qualities, fisheries, and wildlife values, and the near-natural setting for 13 waterway segments if these segments are added to the National Wild and Scenic Rivers system. Alternative D would provide the second most benefit to these same values. Alternatives A and C would allow resource uses in the areas of these waterway segments; however, Alternative A would provide more protection to these segments by allowing resources uses on a case-by-case basis.

4.7.3 Wilderness Study Areas

Raymond Mountain WSA (Existing)

Maintaining and emphasizing preservation of the flora and fauna within the naturally occurring ecosystems is the primary objective for designating the 32,880-acre Raymond Mountain WSA.

4.7.3.1 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- Raymond Mountain WSA will remain under the *Interim Management Policy and Guideline for Lands Under Wilderness Review: Update Document H-8550, 11/10/87* (IMP) (BLM 1995a) until Congress designates them wilderness or releases them for other nonwilderness uses.
- The WSA designation is beneficial to, the protection of air and watersheds, soil and water quality, ecological stability, plant and animal gene pools, archeological and historical sites, habitats for wildlife, and livestock grazing.

4.7.3.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under all alternatives, the 32,880 acres continue to be designated as the Raymond Mountain WSA and are managed under the WSA IMP, which "is temporary and applies only during the time an area is under wilderness review and until Congress acts on WSAs…" (BLM 1995a). If Congress acts and designates the area as wilderness, it will be managed under BLM Manual 8560. If Congress acts and does not designate the area as wilderness, it will be managed under general BLM management policies, with some exceptions described under specific alternatives for other types of proposed management. Lands adjacent to the Raymond Mountain WSA currently are not managed as wilderness.

Alternative A

Under Alternative A, the 32,880 acres continue to be designated as the Raymond Mountain WSA, and managed under the WSA IMP (Map 61). No new leases or exploration licenses may be issued on lands within the WSA. Outside of existing limitations due to unpatented mining claims, the planning area is available for consideration of mineral materials sales and (or) free use permits. No new sodium leases or exploration licenses may be issued on lands within the Raymond Mountain WSA. This applies to public lands, including split-estate lands where federal mineral estate underlies nonfederal surface, within the boundaries of the WSA. Most of the WSA is closed to OHV use, motor vehicle travel, and snow machine use. Under Alternative A, the Raymond Mountain WSA remains a high-priority area for access acquisition.

Benefits from retaining the area as the Raymond Mountain WSA under Alternative A include enhanced protection of the flora and fauna, air and watersheds, soil and water quality, ecological stability, plant and animal gene pools, archeological and historical sites, habitats for wildlife, and livestock grazing within the naturally occurring ecosystems. Potential adverse impacts from retaining the Raymond Mountain WSA under Alternative A are expected to be minimal to resource uses as the area exhibits low oil and gas, coal, and phosphate development potential. In addition, less than 300 acres in the area exhibit wind-energy development potential.

Alternative B

Under Alternative B, if Congress acts and does not designate the area as wilderness, the 32,880 acres will continue to be managed under the WSA IMP (BLM 1995a) (Map 62). Therefore, impacts under Alternative B are the same as those described under Alternative A.

Alternative C

Under Alternative C, if Congress acts and does not designate the area as wilderness, the 32,880 acres will be managed in the same manner as adjacent BLM-administered lands. Beneficial impacts under Alternative C includes fewer restrictions on other resource uses; adverse impacts include loss of protection for the floral, faunal and other natural, cultural, and livestock resources found within the naturally occurring ecosystems.

Alternative D (Preferred Alternative)

Under Alternative D, if Congress acts and does not designate the area as wilderness, the 32,880 acres will continue to be managed under the WSA IMP (BLM 1995a) until a new management plan is prepared and the RMP is amended. Therefore, impacts under Alternative D are the same as Alternative B until a new management plan is prepared.

4.7.3.3 Conclusion

Until Congress acts, the alternatives are not quantifiably different and will have the same impacts as described under Alternative A. If Congress acts and does not designate the area wilderness, then Alternative B provides the most benefit to the preservation of the flora and fauna within the naturally occurring ecosystems, followed by alternatives D and C respectively.

4.7.4 Back Country Byways

Emigrant Springs Back Country Byway (Proposed)

Enhancing motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding and heritage tourism is the primary objective for designating the Emigrant Springs Back Country Byway (see Map 65). This proposed back country byway would include approximately 4.5 miles of primitive two-track road and approximately 11 miles of crowned and ditched gravel road.

4.7.4.1 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- No additional land use constraints are associated with designation of the Emigrant Springs Back Country Byway.
- Impacts to other resources from constraints associated with cultural resources and VRM are discussed in the respective sections of this chapter.
- Establishment of the Emigrant Springs Back Country Byway will increase use of the road and increase human presence in the area.
- Developments along the BLM-administered land immediately adjacent to the Emigrant Springs Back Country Byway will be restricted to prevent resource conflicts.

4.7.4.2 Analysis of Alternatives

Impacts Common to All Alternatives

Existing adverse and beneficial impacts from the Emigrant Springs road will continue under all alternatives regardless of designation and are considered negligible. Long-term adverse impacts from the current unimproved road are the same as impacts from similar primitive roads in the planning area and include habitat fragmentation, fugitive dust, increased erosion, and potential spread of INNS plant seeds and (or) parts.

Alternative A

Under Alternative A, the current unimproved road remains a primitive four-wheel drive road extending from State Highway 233 from Kemmerer to Dempsey Basin Road, a portion of the improved BLM road-

Dempsey Basin and unimproved two-track trail from Dempsey Basin to Fossil Butte, moderately improved single-lane gravel road through Fossil Butte National Monument, and back onto State Highway 30 to Kemmerer (Map 65). All of the current route is considered primitive and is not designated as a Back Country Byway. Interpretive signs and viewing areas do not exist for the road.

Alternative B

Under Alternative B, the Emigrant Springs road is designated as a Back Country Byway, remains a primitive four-wheel drive road, and is not upgraded from current conditions (Map 65). Road development will be in cooperation with Lincoln County, the National Park Service, and the State of Wyoming. The back country byway will include 4.5 miles of the primitive two-track and 11 miles of crowned and ditched gravel road. The area is managed to provide opportunities to visitors to engage in targeted activities, providing no less than 90 percent of visitors a realization of targeted benefits, while encouraging responsible motorized recreational use of the back country byway and protecting the scenic, cultural, and critical wildlife habitat values that occur in the area. Most of the area will be managed as VRM Class II, and existing facilities will be maintained.

Under Alternative B, beneficial impacts from the Emigrant Springs Back Country Byway include creating a viable transportation route, back country access, and recreation, wildlife, and scenic viewing opportunities. These benefits allow a positive change for residents and visitors, providing the opportunity for experiencing aesthetic appreciation, identification with a special place, improved perception of the quality of life, and improved image of the area and its recreational opportunities. Environmental benefits include creating a sense of “ownership” and stewardship of the historic area, while protecting natural habitats and open space by reducing the temptation for recreators to travel off-road. Economic benefits include retaining recreational spending in local areas, increased contributions to the local economies and increased attractiveness of the area. Potential adverse impacts from designating the Emigrant Springs Back County Byway under Alternative B include increased use of the Emigrant Springs road, and potential increases in soil erosion, road maintenance, and fugitive dust from traffic. In addition, increased human presence and activity in the area may adversely impact biological and heritage resources due to litter, unauthorized plant collection, spread of plant INNS, vandalism, and disruption of wildlife.

Alternative C

Under Alternative C, the Emigrant Springs road is not designated a Back Country Byway. Impacts are the same as those described under Alternative A.

Alternative D (Preferred Alternative)

Under Alternative D, the Emigrant Springs road is designated as a Back Country Byway as described under Alternative B. Benefits and impacts are the same as those described under Alternative B.

4.7.4.3 Conclusion

Alternatives A and C do not designate the existing Emigrant Springs road as a Back Country Byway and are not expected to provide any additional benefit to motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding, or heritage tourism. Alternatives B and D do designate the Emigrant Springs road as a Back Country Byway, and are both expected to have beneficial impacts to motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding, and heritage tourism. Adverse, long-term impacts from the existing road will continue under all alternatives and include habitat fragmentation, fugitive dust, increased erosion, and spread of plant INNS. The anticipated increase in traffic and use of the area following designation as a Back Country Byway under alternatives B and D may be associated with greater adverse impacts from litter, unauthorized plant and cultural resource collection, soil erosion, road maintenance, spread of plant INNS, and vandalism compared to alternatives A and C.

4.8 Socioeconomic Resources

4.8.1 Social Conditions

This section addresses the potential for the alternatives to have impacts on social conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Laws, regulations, policies, and guidance considered in the analysis of social conditions are identified in Appendix B.

Potential impacts that relate to social conditions include changes in population, such as fluctuations caused by economic boom and bust cycles; changes in the demand for housing and community services, along with community fiscal conditions, which can impact the ability of state, regional, and local governments to supply community services such as education; and changes in community character, culture, and social trends. The BLM does not directly manage social conditions in the planning area; however, BLM management actions could impact social conditions indirectly. For example, a decision to prohibit future oil and gas exploration or leasing on federal mineral estate could adversely impact job opportunities in the planning area, which could lead to reductions in populations in parts of the planning area as residents move away to find job opportunities elsewhere (or as fewer people move to the planning area for jobs). For the purpose of this analysis, short-term social impacts are defined as those that would last for 5 years or less, while long-term social impacts are defined as those that would last for more than 5 years.

4.8.1.1 Methods and Assumptions

Impacts to social conditions associated with each of the alternatives were compared to existing conditions and trends in the planning area to establish a context for the impacts. As noted in Section 3.8.1 Social Conditions, BLM management actions can impact social conditions in nearby communities as well as the planning area; thus, the analysis of social and economic impacts encompasses the entire counties of Lincoln, Uinta, and Sweetwater. Social impacts were classified broadly into three categories: impacts on population, impacts on housing and community services, and impacts on custom, culture, and social trends.

Assumptions used in this impact analysis include the following:

- Economic conditions, especially jobs, labor earnings, and economic output, will continue to be a driver of population growth in the planning area.
- Any population change that could reasonably be associated with the alternatives will likely be due to changes in employment opportunities.
- Federal, state, and local taxes will continue to be collected on minerals produced in the planning area.

The pace and timing of future mineral and energy resource development in the planning area will depend on many factors beyond the management actions of the BLM. History and reason suggest that future development will likely vary over time, potentially quite dramatically. However, because of the uncertainty in projecting the pace and timing of future development, the assessment of social and economic consequences is based on a relatively constant level of development over time. That assumption results in the portrayal of average changes or impacts over time, even though those specific changes may not actually occur or be observed. Actual social and economic impacts would depend on changes in the rate of development, and would include the potential for adverse impacts associated with boom and bust cycles.

4.8.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Any population change that could reasonably be associated with the alternatives would likely be due to changes in employment opportunities. Employment opportunities related to activities on BLM-administered surface land and federal mineral estate include jobs in exploration, development, and production of minerals, including oil and gas, coal, trona, locatable and salable minerals; jobs in livestock production; jobs in various recreational activities and OHV use; and other jobs that rely on land administered by the BLM, such as management of wildlife and plant species that use BLM-administered lands. The economic analysis provides quantitative estimates of employment in the planning area due to oil and gas, grazing, and recreational activities on BLM-administered surface lands and federal mineral estate. These quantitative estimates are used to aid in the analysis of impacts on population.

As indicated in the Economic Conditions section, the BLM does not expect production of trona or locatable or salable minerals to vary by alternative. One implication is that employment opportunities associated with exploration, development, and production of these minerals would not vary by alternative. This does not mean that these employment opportunities are unimportant. While coal production may vary by alternative (since the proposed surface coalmine in the Haystack area could be leased under Alternatives A, C, and D), there are no operations plan production quantity forecasts at this time, which means there is not sufficient information to reliably estimate variations in coal-related employment. Again, this does not imply that employment opportunities associated with the potential Haystack coal mine, or the Kemmerer mine, are unimportant.

In all alternatives, if the pace of development differs from the relatively constant rate assumed in this analysis, there could be short-term impacts on demand for housing and community services and on the supply of tax revenues from residences or businesses to support community services due to short-term changes in job opportunities and the resulting change in in-migration or out-migration. It would likely be more difficult for smaller communities to absorb a sudden influx of new residents or to continue to support existing infrastructure if out-migration suddenly increased. Variances in the actual pace of development and subsequently, production, will also affect local and state revenues tied to mineral and energy resource production.

Finally, in all alternatives, the BLM would continue to consider socioeconomic impacts of site-specific actions and incorporate socioeconomic issues into analyses of environmental, social, and economic impacts, such as the analyses required by NEPA for certain future site-specific actions.

Alternative A

Impacts on Population

In Alternative A, activities on BLM-administered surface land and federal mineral estate related to oil and gas, livestock grazing, and recreation would continue to support an average of 939 to 974 full-time and part-time jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. It is important to note that this does not constitute an increase of 939 to 974 jobs per year over current employment; it more closely represents an estimate of the contribution of certain activities on BLM-administered surface lands and federal mineral estate to overall employment in the planning area.

As shown in the analysis of impacts on economic conditions, about 60 percent of job opportunities from activities analyzed using the Impact Analysis for Planning (IMPLAN) model would be related to oil and gas development and production. Recreation would contribute about 25 percent of job opportunities, and livestock grazing would contribute about 15 percent. Because recreation and livestock grazing are dispersed over the planning area, and oil and gas development occurs in several different locations in the planning area, the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, there likely would be some concentration of job opportunities

in population centers, including Kemmerer and Evanston. Some job opportunities related to development of oil and gas resources also may be based outside the planning area, such as in Green River and Rock Springs, due to those areas' roles as an oil and gas service center. Less densely populated towns or unincorporated areas in the planning area could also experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb. Population declines, with the attendant impacts on community social conditions, could also occur in response to slow-downs in the pace of development.

Impacts on Housing and Community Services

Changes in population also could change the demand for housing and community services, such as roads, schools, and police and fire protection. As described in Chapter 3, county-wide vacancy rates in 2000 (the latest year for which county-level data are available) were 23 percent in Lincoln, 11 percent in Sweetwater, and 15 percent in Uinta County. These percentages represent about 1,600 vacant units in Lincoln, 1,800 vacant units in Sweetwater, and 1,200 in Uinta County. County-wide rental vacancy rates in recent years have been somewhat lower (ranging from about one percent to about 13 percent in the summer, and from about one percent to about 17 percent in the winter, depending on the county; see Table 3-39). The annual average number of jobs predicted under this alternative would not result in a substantial impact on the availability of housing (in part because, as noted above, the employment estimate represents the contribution of certain activities on BLM-administered surface and mineral estate to overall employment in the planning area. rather than representing new jobs). As noted in the section on impacts common to all alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services would be similar to those described for the housing stock. Increased job opportunities could support the recent steady population growth, which would lead to increased demand for community services. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services because of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

Alternative A would maintain existing conditions, let other forces lead changes in the planning area, and allow social conditions to be directed by forces other than a substantive change in BLM management. Although there are specific interest groups with particular interests regarding specific land uses (e.g., wilderness advocates, oil and gas interests, ranchers), on the whole residents of the planning area tend to support both conservation of natural resources and the economic viability of resource-based industries. For this reason, residents generally support multiple uses of BLM-administered lands, including the development of mineral and energy resources, livestock grazing authorizations, opening of lands to recreation, and conservation of wildlife and native vegetation. This alternative would continue the BLM's current practice of allowing multiple uses. As indicated in the section on impacts common to all alternatives, under this alternative, as under all the alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions.

Alternative B

Impacts on Population

Activities on BLM-administered surface land and federal mineral estate in this alternative related to oil and gas, recreation, and livestock grazing would support an average of 714 to 734 jobs per year, which represents about 1.5 percent of total employment in the planning area as of 2004. Compared to Alternative A, this represents a decrease in employment opportunities amounting to about 0.5 percent of 2004 employment. All the decrease in employment opportunities compared to Alternative A would be in oil and gas; Alternative B would result in a slight increase in livestock grazing-related jobs compared to Alternative A (about five jobs).

The decrease in job opportunities relative to Alternative A could result in a minor decrease in population. The reduction in job opportunities represents 0.5 percent of total 2004 employment; population could drop by a corresponding amount. However, population changes would not necessarily correlate perfectly with changes in employment opportunities, since population levels depend on numerous factors in addition to job opportunities: quality of life, quality of schools and other social services, home affordability, and comparisons relative to other communities, to name a few.

As shown in the analysis of impacts on economic conditions, about 50 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production. Recreation would contribute about 33 percent of the job opportunities, and livestock grazing would contribute about 18 percent. Because recreation and livestock grazing are dispersed over the planning area, and oil and gas development occurs in several different locations in the planning area, the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. Despite the overall reduction in oil and gas job opportunities compared to Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, which less densely populated towns or unincorporated small areas may be less able to absorb. However, the magnitude of these potential short-term increases would be smaller relative to under Alternative A; in addition, BLM's increased emphasis on collaborative management under this alternative may help to mitigate impacts related to the absorption of new population.

Impacts on Housing and Community Services

Changes in population also could change the demand for housing and community services, such as roads, schools, and police and fire protection, while changes in tax revenues due to mineral production could change the ability of communities to pay for community services. The annual average number of jobs predicted under this alternative may contribute to a slight decrease in demand for housing and community services compared to Alternative A, especially in cities and towns that house or support oil and gas workers (e.g., Kemmerer and Evanston). As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It would likely be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services would be similar to those described for the housing stock; that is, there may be a slight decrease in demand for community services compared to Alternative A. In addition, some areas may experience declining tax revenues due to a decrease in oil and gas activity compared to Alternative A, which could affect the communities' abilities to fund and provide community services. If national and international energy prices, operator business strategies, or other factors lead to a

rapid pace of development, there could be sudden short-term increases in demand for community services as a result of new jobs and increased population.

Impacts on Custom, Culture, and Social Trends

Alternative B would provide for less economic development than Alternative A, but it would retain natural and rural conditions to a greater degree than Alternative A. Alternative B would indirectly impact the social well-being of communities in the planning area with restrictions on economic development via the use of resources. This alternative would continue BLM's current strategy of allowing multiple uses, but with more emphasis on resource protection.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions; under Alternative B, the BLM would provide these analyses with the explicit goal of mitigating impacts through collaborative management, where possible. In addition, under this alternative, the BLM would attempt to minimize the conflicts associated with mineral extraction, while stressing a balanced approach to diversify and enhance local economies, such as stressing the development of renewable energy and recreational opportunities. Thus, under this alternative, impacts on custom, culture, and social trends would tend to be reduced compared to Alternative A because of BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

Alternative C

Impacts on Population

Oil, gas, recreation, and livestock grazing activities on BLM-administered surface land and federal mineral estate in this alternative would support an average of 941 to 976 jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. This represents a small increase compared to Alternative A, amounting to about two jobs—a negligible difference compared to total employment in the three counties (47,000 jobs in 2004). The difference in employment opportunities compared to Alternative A would be in oil and gas; job opportunities in livestock grazing and recreation would be identical to those in Alternative A. There also may be employment opportunities related to the opening of the proposed surface coalmine in the Haystack area. The potential number of jobs related to this proposed mine has not been quantified due to the lack of a reliable forecast for quantity and cost of production.

The relative contributions of oil and gas, recreation, and livestock grazing to job opportunities from activities analyzed using the IMPLAN model would be the same as in Alternative A (60 percent related to oil and gas development and production, 25 percent related to recreation, and 15 percent related to livestock grazing). As in Alternative A, the fact that recreation and livestock grazing, and to some degree oil and gas development, are dispersed over the planning area mean that the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, as in Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston, and some oil- and gas-related job opportunities may be based outside the planning area. Less densely populated towns or unincorporated areas in the planning area also could experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb.

Impacts on Housing and Community Services

The impacts on housing and community services are expected to be identical to those of Alternative A. As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature.

If national and international energy prices, operator business strategies, or other factors lead to a short-term increase in the pace of development, there could be short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

The impacts on custom, culture, and social trends associated with Alternative C would be similar to those of Alternative A. Alternative C would indirectly impact the social well-being of communities in the planning area by allowing more economic development via the resource development. This alternative would continue the BLM's current strategy of allowing multiple uses, but with more emphasis on resource development.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative C, the BLM would provide quantitative analyses that have been developed for proposed site-specific actions without explicit mitigation plans, except for any that are required under NEPA. Under this alternative, impacts on custom, culture, and social trends from future site-specific actions would tend to be similar to those under Alternative A.

Alternative D (Preferred Alternative)

Impacts on Population

Oil, gas, recreation, and livestock grazing activities on BLM-administered surface land and federal mineral estate in this alternative would support an average of 934 to 969 jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. This represents a small decrease compared to Alternative A, amounting to about five jobs – a negligible difference in comparison to total employment in the three counties (47,000 jobs in 2004). The decrease in employment opportunities compared to Alternative A is attributable to oil and gas; job opportunities in livestock grazing and recreation would be slightly higher than in Alternative A (by three jobs and by one job, respectively). As in Alternative C, there also may be employment opportunities related to the opening of the proposed surface coalmine in the Haystack area. The potential number of jobs related to this proposed mine has not been quantified due to the lack of a reliable forecast for quantity and cost of production.

The relative contributions of oil and gas, recreation, and livestock grazing to job opportunities from activities analyzed using the IMPLAN model would be about the same as in Alternative A (60 percent related to oil and gas development and production, 25 percent related to recreation, and 15 percent related to livestock grazing). As in Alternative A, the fact that recreation and livestock grazing and to some degree oil and gas development are dispersed over the planning area mean that the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, as in Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston, and some oil- and gas-related job opportunities may be based outside the planning area. Less densely populated towns or unincorporated areas in the planning area also

could experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb.

Impacts on Housing and Community Services

As in Alternative A, the annual average number of jobs predicted under this alternative likely would not result in a substantial impact on the availability of housing. As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature. Impacts on demand for community services would be similar to those described for Alternative A.

Impacts on Custom, Culture, and Social Trends

The impacts on custom, culture, and social trends associated with Alternative D would be similar to those of Alternative A. Alternative D would indirectly impact the social well-being of communities in the planning area to some degree, but would continue BLM's current strategy of allowing multiple uses.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative D, the BLM would provide these analyses with the explicit goal of mitigating impacts through collaborative management, where possible. Also under this alternative, the BLM would attempt to minimize the conflicts associated with mineral extraction, while stressing a balanced approach to diversify and enhance local economies, such as stressing the development of renewable energy and recreational opportunities. Thus, under Alternative D, impacts on custom, culture, and social trends would tend to be reduced compared to Alternative A because of the BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

4.8.1.3 Conclusion

Social conditions are related primarily to economic conditions that may influence the growth or development of employment and income. The economic sectors in the planning area that are most likely to be directly affected by BLM management actions are related to the service sector and resource development activities (e.g., oil and gas). That is not to imply that grazing, ranching, and other agricultural activities are unaffected or unimportant. However, based on their economic contribution to the overall economy, changes in this sector would be expected to produce relatively minor economic impacts in the overall economy. Nonetheless, the agricultural sector in this area is quite influential in terms of community character and identity. Thus, land management decisions affecting the agricultural sector could have far reaching impacts on the social structure in the planning area, even though the economic impact is not expected to be substantial.

Table 4-14 provides a summary of impacts on social conditions as discussed in this section for alternatives B, C, and D compared to Alternative A. Although the table attempts to summarize impacts and characterize them as low, medium, or high, it does not classify these impacts as beneficial or adverse. Social impacts seen as beneficial to some interest groups could be seen as adverse to other interest groups. For instance, increased emphasis on resource conservation in Alternative B would result in a change from the current balance of uses, which would likely be seen as a beneficial impact by wilderness advocates, but an adverse impact by oil- and gas-development interests. In the table, high impacts are those that would result in substantial changes to an existing condition that would affect a large number of people and (or) endure for a long time; low impacts are those that would be felt by a limited number of people and for a limited time; and medium impacts are intermediate.

Table 4-14. Overall Impacts on Social Conditions in the Kemmerer Planning Area by Alternative, Compared to Alternative A

Impact	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Estimated Impact on Population	NA	Medium Impact (potential reductions focused in oil/gas service areas)	Low Impact	Low Impact
Estimated Impact on Housing and Community Services	NA	Medium Impact (due to potential population reductions)	Low Impact	Low Impact
Estimated Impact on Custom, Culture, and Social Trends	NA	Low to Medium Impact (change from recent trends would constitute greater emphasis on resource conservation; however, there would be an increased emphasis on collaborative management and mitigating impacts of future site-specific actions)	Low Impact	Low Impact (with increased emphasis on collaborative management and mitigating impacts of future site-specific actions)

Source: Based on the analysis of impacts to social conditions, as described in the text.
NA Not applicable

4.8.2 Economic Conditions

This section addresses the potential for the alternatives to have impacts on economic conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Laws, EOs, regulations, policies, and guidance considered in the analysis of economic conditions are identified in Appendix B.

Potential impacts include changes in regional economic output, employment, and earnings, and in tax revenues for the local, state, and federal governments. In terms of economic modeling analysis, direct and indirect impacts are assumed to occur simultaneously, even though in reality, these impacts may take time to work their way through the economic sectors in the analysis area. For example, an action to permit gas exploration and production may result in the direct infusion of money into several economic sectors and indirect infusions into related sectors. In economic modeling, these impacts would be assumed to occur instantaneously. Moreover, continued direct infusion of money into the planning area's economy created by the decision to lease oil and gas would be analyzed over the life of the project, which in this case, is likely to represent a multiyear period of production. Thus, the analysis is designed to account for the economic activity produced by planning decisions over time. The impacts are estimated on an annual basis through 2020 based on the estimated annual direct impact of the alternatives. For the purpose of this analysis, short-term economic impacts are defined as those that would last for 5 years or less, while long-term economic impacts are defined as those that would last for more than 5 years.

4.8.2.1 Methods and Assumptions

The BLM used the IMPLAN model to estimate economic impacts resulting from BLM management actions under the alternatives. IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (or "multiplier effect") of changes in sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly affected) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

For instance, an increase in oil and gas production implies more money would be spent on the maintenance of existing oil and gas equipment and (or) new oil and gas equipment; this, in turn, implies more money would be spent in sectors that provide inputs to oil and gas support services or equipment

sectors. These production and consumption or "input-output" relationships allow IMPLAN to estimate the indirect and induced impacts based on changes in production that may result from an alternative. Appendix K provides technical assumptions and additional information about the IMPLAN model.

Assumptions used in this analysis include the following:

- Employment, earnings, and output would continue to be a driver of economic and population growth in the planning area.
- Economic benefits to the planning area would accrue from BLM-influenced activities, such as oil and natural gas development, livestock grazing, and recreation. Economic benefits to the analysis area also would accrue from wildlife grazing, to the extent that wildlife grazing contributes to the availability of and demand for recreational activities.
- Indirect and induced benefits due to minerals, livestock grazing, and recreation can reasonably be estimated by the IMPLAN model. (The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area.)
- Recreation related expenditures by residents would occur in the region, but would not represent new money coming into the study area. Therefore, the analysis of economic impacts from recreation considers only recreation expenditures of nonresidents of the three-county area. To be more specific, there is a multiplier effect associated with nonresident recreation related spending that injects new money into the study region. By knowing the amount of additional nonresident recreational spending associated with each management alternative, the total economic impact can be estimated.
- The analysis of direct and indirect impacts associated with oil and gas activity considers only activities on BLM-administered surface and federal mineral estate. For the purpose of economic analysis, only costs associated with drilling, completion, and production are included.
- For livestock grazing, the analysis reflects a "worst-case" assumption that all acres affected by surface-disturbing actions (from all the sources listed in Appendix M) would be lands currently authorized for grazing; thus, the number of acres available for grazing in 2020 is the number of acres currently available, minus all acres that would be affected in the long term by surface-disturbing actions. In addition, the analysis of grazing reflects the assumption that surface-disturbing actions would occur at a constant rate over time.

In addition, the analysis reflects two alternative assumptions regarding the expenditures of workers involved in oil and gas drilling and completion activities. These alternative assumptions follow:

- The "high scenario" reflects an assumption that workers involved in oil and gas drilling and completion reside within the socioeconomic study area (i.e., Lincoln, Sweetwater, and Uinta counties) and, therefore, spend most or all of their earnings in the socioeconomic study area.
- The "low scenario" reflects an assumption that workers involved in oil and gas drilling and completion spend none of their earnings in the socioeconomic study area.

The pace and timing of future mineral and energy resource development in the planning area will depend on many factors beyond the management actions of the BLM. These include national and international energy demand, supply, and prices; operator business strategies; production conditions within the planning area; and demand and supply for agricultural products. History and reason suggest that future development will likely vary over time, potentially quite dramatically. However, because of the uncertainty in projecting the pace and timing of future development, the assessment of social and economic consequences is based on a relatively constant level of development over time. That assumption results in the portrayal of average changes or impacts over time, even though those specific

changes may not actually occur or be observed. Actual social and economic impacts would depend on changes in the rate of development, and include the potential for adverse impacts associated with boom and bust cycles.

The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. Specifically, worker productivity in oil and gas production is higher in Wyoming than nationally, and more of the hay used for livestock feed is produced within the region compared with national averages. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output (Taylor 2004).

4.8.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

The focus of the following analysis is on the resource activities most likely to be affected by land management decisions, including oil, gas, livestock grazing, and recreation (including OHV use). Actions from resource programs or constraints (as described in the alternatives) that impact oil, gas, livestock grazing, OHV, and recreation (e.g., surface-disturbing actions that affect the amount of land available for grazing) are included by implication. Also included by implication are restrictions on ROW and corridors and the BLM's Reasonable Foreseeable Development Scenario for oil and gas, which provides estimated numbers of oil and gas wells and production, and incorporates the restrictions on ROW and corridors. Restrictions on new ROW would tend to be a negligible factor in the decision to develop additional oil and gas wells in fields that are already producing, but could be an important factor in a decision to develop a new field.

Economic impacts related to other resources, such as coal, trona, and renewable energy development, are addressed outside the framework of the IMPLAN model. For instance, while coal production may vary by alternative (since the proposed surface coalmine in the Haystack area could be leased under alternatives C and D), there are no production quantity forecasts at this time, which means there is not sufficient information to reliably estimate data needed to estimate direct employment, or to run the IMPLAN model to estimate indirect or induced employment. For locatable and salable minerals, the BLM generally expects to meet market demand and process claims and applications so that the production of these minerals would not vary across the alternatives being considered. The BLM also does not expect the alternatives to affect the quantity of trona produced; the amount of trona mined and processed in the planning area may vary depending on market conditions or other non-BLM actions, but would not differ across the alternatives. Thus, the sections below on effects under each alternative do not include earnings, jobs, or output related to trona production; however, this does not mean trona production is unimportant (e.g., see Economic Conditions in Chapter 3 for information on current employment and payroll from trona mining and processing operations). For more information on minerals, refer to the Mineral Resources sections.

The primary driver of wind-energy development will be market forces, including prices for nonwind energy sources, as well as other factors. BLM decisions regarding management of BLM-administered land will have some impact with respect to economic opportunities related to wind-energy development (e.g., some restrictions on land that can be developed for wind energy under Alternative B), but these impacts will be small relative to overall market conditions. The Renewable Energy section reports on the impacts of BLM decisions with respect to development of wind-energy sources.

Changes in economic activity have impacts on federal, state, and local tax revenues. While all sectors of the economy contribute to tax revenues, the analysis of tax revenue impacts focuses on oil and gas

production because almost all of the variation in economic activity across the alternatives is in the oil and gas sector.

The focus of the analysis is on regional earnings and output, employment, and tax revenue, with the region defined as the three-county planning area. Because the exact locations of additional well drilling and certain other surface-disturbing activities are not known at this time, it is difficult to predict impacts on specific grazing allotments or other specific parcels within the planning area. In the case of grazing allotments, the impacts of surface-disturbing actions are expected to occur over a relatively long time (20 years). Coupled with the relatively small impacts on grazing estimated to occur for all alternatives (as described for individual alternatives below), the implication is that impacts on individual allotments are likely to be minor. In certain cases the impacts may be greater and would be reviewed on a project specific basis.

Alternative A

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative A would average between $27.9 and $28.7 million per year between 2001 and 2020 and regional output would average between $382.3 and $384.0 million per year due to activities on BLM-administered surface lands and federal mineral estate. The net present value of the stream of regional output, discounted at a 7-percent real discount rate (OMB 2002), would be between $3,379 and $3,405 million over 20 years. (As described in the Methods and Assumptions section, the range of impacts reflects alternative scenarios regarding how much of the earnings of oil and gas drilling and completion workers would spend within the three-county area.) Table 4-15 shows sector-level breakouts for earnings and output.

Table 4-15. Average Annual Impacts on Earnings and Output by Sector and Alternative for the Kemmerer Planning Area

Sector	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Impacts on Annual Average Earnings (millions of 2004 $)				
Oil and Gas[1]	$22.1 - $22.8	$13.3 - $13.7	$22.2 - $22.9	$21.7 - $22.5
Livestock Grazing	$2.6	$2.6	$2.6	$2.6
Recreation	$3.3	$3.3	$3.3	$3.3
Total[1]	$27.9 - $28.7	$19.2 - $19.6	$28.0 - $28.8	$27.7 - $28.4
Impacts on Annual Average Output (millions of 2004 $)				
Oil and Gas[1]	$363.1 - $365.7	$228.4 - $229.9	$364.2 - $366.8	$359.6 - $362.1
Livestock Grazing	$8.3	$8.6	$8.3	$8.5
Recreation	$10.9	$10.9	$10.9	$11.0
Total[1]	$382.3 - $384.9	$247.9 - $249.4	$383.4 - $386.0	$379.1 - $381.6
Impacts on Net Present Value of Output over 20 Years (millions of 2004 $)[2]				
Oil and Gas[1]	$3,177 - $3,203	$2,043 - $2,059	$3,187 - $3,213	$3,146 - $3,171
Livestock Grazing	$89	$92	$89	$91
Recreation	$113	$113	$113	$113
Total[1]	$3,379 - $3,405	$2,247 - $2,263	$3,388 - $3,415	$3,350 - $3,375

Source: Calculated using the IMPLAN model, as described in the text.

[1]The range of estimated impacts represents the high and low scenarios for oil and gas drilling and completion, which are described in the text. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

[2]Net present value from 2001 to 2020, discounted at 7 percent (rate from OMB 2002).

IMPLAN Impact Analysis for Planning model

Impacts on Employment

From a methods standpoint, employment impacts should not be considered separately from output impacts, for there is a close relationship between the two. Employment can be thought of as a function of the level of economic activity (sales and purchases) among and between sectors.

Based on the IMPLAN model, regional employment under Alternative A would average between 939 and 974 jobs per year[1] between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate. Table 4-16 provides information on how these jobs break out by sector.

Average annual earnings per job would differ for each of these sectors. Based on the IMPLAN model, earnings per job (expressed in year 2004 dollars) would average as follows:

- Between $36,107 and $37,758 for jobs in oil and gas well drilling and between $34,603 and $35,309 for jobs in well completion.
- $40,238 for jobs in oil and gas production.
- $26,626 for jobs associated with cattle grazing and $12,341 for jobs associated with sheep grazing.
- Between $12,950 and $16,125 for recreation-related jobs.

Table 4-16. Average Annual Impacts on Employment by Sector and Alternative for the Kemmerer Planning Area

Sector	Number of Jobs[1]			
	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Oil and Gas	574 - 610	345 - 365	576 - 612	565 - 600
Livestock Grazing	127	132	127	130
Recreation	238	238	238	239
Total	939 - 974	714 - 734	941 - 976	934 - 969

Source: Calculated using the IMPLAN model, as described in the text.

[1] Number of jobs is in annual job equivalents (AJE), where one AJE represents 12 months of employment. For instance, one AJE could represent one job for 12 months or two jobs for 6 months.

The range of estimated impacts represents the high and low scenarios for oil and gas drilling and completion, which are described in the text. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

IMPLAN Impact Analysis for Planning model

Impacts on Tax Revenue

Projected tax revenues for Alternative A due to oil and gas production on federal minerals would average $32.2 million per year for federal royalties, $15.5 million per year for state severance taxes, and $16.2 million per year for local ad valorem taxes. Because specific well locations are not known at this time, there are no sufficient data to apportion the local tax receipts to individual counties. Table 4-17 provides a summary of tax revenues from oil and gas production for the alternatives.

[1] The number of jobs is expressed as "annual job equivalents," where one annual job equivalent (AJE) represents 12 months of employment. For example, one AJE could represent 2 jobs for six months each, or one job for 12 months. AJEs may represent either full-time or part-time jobs.

Table 4-17. Estimated Oil and Gas Tax Revenues by Alternative for the Kemmerer Planning Area (millions of 2004 $)

Tax Type	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Federal mineral royalties	$32.2	$20.5	$32.3	$31.9
State severance taxes	$15.5	$9.8	$15.5	$15.3
Local *ad valorem* production taxes	$16.2	$10.3	$16.3	$16.1
Total	$63.9	$40.6	$64.1	$63.4

Source: Calculated based on projected production, state, federal, and local tax rates, and assumed values.
IMPLAN Impact Analysis for Planning model

Alternative B

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative B would average between $19.2 and $19.6 million per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate. Although regional earnings under Alternative B amount to only about two-thirds the amount projected for Alternative A based on the activities analyzed in IMPLAN, the difference (about $9 million per year) amounts to just 0.4 percent of 2004 total personal income in the three-county socioeconomic study area; thus, the difference between alternatives A and B amounts to a relatively small portion of total earnings. As Table 4-15 shows, the difference between the alternatives is due entirely to the difference in oil and gas activity; earnings from recreation and livestock grazing are identical (to one decimal point). Regional output would average between $247.9 and $249.4 million per year, with a net present value of between $2,247 and $2,263 million (Table 4-15).

Alternative B would be more restrictive in terms of allowing renewable energy development compared to Alternative A. However, the amount of wind-energy development in any alternative would mainly be influenced by market conditions and development potential relative to other areas and, therefore, cannot be predicted quantitatively at this time.

Under Alternative B, the Bear River Divide MA would severely constrain a proposed building stone operation. The operation has been proposed and has staked a mining claim, but there is not yet a plan of operations. Economic impacts would be minimal (i.e., the plant will likely employ two or three people within the planning area and the product would likely be sold outside the planning area).

Impacts on Employment

Regional employment under Alternative B would average between 714 and 734 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate analyzed in the IMPLAN model. Although this number of jobs is only three-quarters the level predicted for Alternative A (Table 4-16), the difference amounts to just 0.5 percent of the total employment in the three-county area in 2004 (47,414 jobs). Average annual earnings per job in Alternative B would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production would average $20.5 million per year for federal royalties, $9.8 million per year for state severance taxes, and $10.3 million per year for local ad valorem tax receipts (Table 4-17). These figures represent a decrease of about 36 percent compared to Alternative A.

Alternative C

Impacts on Regional Earnings and Output

Regional earnings under Alternative C would average between $28.0 and $28.8 million between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate analyzed in IMPLAN – slightly more than the amount projected for Alternative A. As Table 4-15 shows, the difference in earnings compared to Alternative A is due to a small difference in oil and gas activity projected in Alternative C; earnings due to livestock grazing and recreation are identical. Regional output would average between $383.4 and $386.0 million per year, with a net present value of between $3,388 and $3,415 million over 20 years due to activities on BLM-administered surface lands and federal mineral estate (Table 4-15).

Under Alternative C, the area of the proposed Haystack site would be open for potential development of a coalmine. Additional jobs would be at this mine, assuming it were to open. However, the mine opening is relatively far off (current information suggests that mining may occur approximately 10 years after RMP approval), and there are no plan for operations or forecasts for production quantity at this time. Thus, the number of jobs and impacts on earnings are difficult to forecast.

Impacts on Employment

Regional employment would average between 941 and 976 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate (Table 4-16). This is slightly higher than for Alternative A – higher by just two jobs, which is a tiny percentage of the 47,414 jobs in the three-county area as of 2004. Average annual earnings per job would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production would be about the same as under Alternative A: $32.3 million per year for federal royalties, $15.5 million per year for state severance taxes, and $16.3 million per year for local ad valorem tax receipts (Table 4-17).

Alternative D (Preferred Alternative)

Impacts on Regional Earnings and Output

Regional earnings under Alternative D would average between $27.7 and $28.4 million between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate – slightly less than for Alternative A. As with the other alternatives, the difference in regional earnings is driven by changes in oil and gas activity (Table 4-15).

Regional output would average between $379.1 and $381.6 million per year due to activities on BLM-administered surface lands and federal mineral estate. The net present value of the stream of output would be between $3,350 and $3,375 million over 20 years (Table 4-15).

Under Alternative D, similar to Alternative C, the area of the proposed Haystack site would be open for potential development of a coalmine. Additional jobs would be at this mine assuming it were to open. However, the mine opening is relatively far off (current information suggests that mining may occur approximately 10 years after RMP approval), and there are no plan for operations or forecasts for production quantity at this time. Thus, the number of jobs and impacts on earnings are difficult to forecast.

Under Alternative D, the Bear River Divide MA would allow mineral material sales and (or) free use permits, therefore the establishment of this MA would not constrain a proposed building stone operation. The operation has been proposed and has staked a mining claim, but there is not yet a plan of operations. Economic impacts would be minimal (i.e., the plant will likely employ two or three people within the planning area and the product would likely be sold outside the planning area).

Impacts on Employment

Regional employment would average between 934 and 969 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate, which is slightly less than the level predicted for Alternative A (Table 4-16); the difference compared to Alternative A, five jobs, is not substantial in comparison to the total number of jobs in the three-county area in 2004 (47,414). Average annual earnings per job would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Based on the analysis, projected tax revenues would average $31.9 million per year for federal royalties, $15.3 million per year for state severance taxes, and $16.1 million per year for local ad valorem tax receipts (Table 4-17). These figures represent a small decrease (about 0.8 percent) compared to Alternative A.

4.8.2.3 Conclusion

Overall, earnings, output, employment, and tax revenues due to activities on BLM-administered land and mineral estate would be nearly identical among alternatives A, C, and D. Earnings, output, employment, and tax revenues would be lower under Alternative B. Differences in projected oil and gas activity are the primary reason for overall differences in these economic measures in Alternative B.

The difference in earnings projected to result from the different alternatives represents a small proportion of total earnings in the socioeconomic analysis area in 2004. This is quite clear in comparing alternatives A, C, and D: earnings in Alternative C are higher than in Alternative A, but only by $0.1 million per year, and earnings in Alternative D are lower than in Alternative A by just $0.3 million per year (based on the high scenario, in which oil and gas drilling and completion workers spend most or all of their earnings in the three-county area; the differences are comparable for the low scenario). For Alternative B, earnings are lower than in Alternative A by $9.0 million per year (in the high scenario), but this still amounts to just 0.4 percent of the total personal income in the three-county area in 2004, which was $2,318 million.

Similarly, differences in employment across the alternatives represent a small proportion of total employment in the three-county area in 2004. Total employment was 47,414 jobs in 2004, and even the largest difference in alternatives (the difference of 240 jobs between alternatives A and B) represents a relatively small proportion of that number. Thus, although BLM management decisions affect the local economy, other activities not on BLM-administered surface land and federal mineral estate also have substantial influence on regional earnings, output, employment, and tax revenues.

4.8.3 Health and Safety

Health and safety, as discussed in this document, includes Abandoned Mine Lands (AML) and hazardous materials and wastes (hazardous materials). Each of these hazards is analyzed below in a separate section.

Health and Safety – Abandoned Mine Lands

To reduce the threat of physical and environmental impacts from AML sites, the Kemmerer Field Office will remediate sites based on risk.

4.8.3.1 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- Most AML sites in the planning area are identified and characterized.
- "The BLM will set as its highest AML physical safety action priority the cleaning up of those AML sites situated at locations: (a) where a death or injury has occurred and the site has not already been addressed; or (b) situated on or in immediate with high visitor use" (BLM 2000c). Under the Clean Water Action Plan, AML sites adversely impacting watersheds also are a high priority. The BLM continues to support the Wyoming DEQ AML Division (DEQAML) in reclaiming AML sites on public surface.

4.8.3.2 Analysis of Alternatives

Impacts Common to All Alternatives

The alternatives described in Chapter 2 are not expected to create new AML sites or increase risks at AML sites.

In cooperation with the DEQAML, the BLM will remediate AML sites posing a substantial risk to human health and the environment. Risk reduction also will occur through educating the public about the hazards associated with abandoned mines using publications, signage, websites, and other educational materials.

An active reclamation program would be established to incorporate cleanup and reduce hazards and will remain in place for all alternatives. Adverse impacts may result if AML sites located within the Raymond Mountain WSA cannot be accessed for reclamation.

4.8.3.3 Conclusion

No differences in impacts to AML sites occur among the alternatives. An active reclamation program is established to incorporate cleanup and reduce hazards and will remain in place for all alternatives.

Health and Safety – Hazardous Materials and Waste

With increased recreational and commercial use of public surface in the planning area comes an inherent risk associated with an increase in the amount of hazardous materials generated, used, transported, and stored.

4.8.3.4 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All new hazardous materials and waste sites are identified and characterized.
- Resource development activities identify any possible generation of hazardous waste.

- No substantial new hazardous materials uses and (or) waste generation occurs within the planning area.
- The BLM's Hazard Management and Resource Restoration Program (HMRRP) responds to all hazardous material releases on public surface. Emergency cleanup actions are implemented on sites posing a substantial threat to the public and (or) the environment.

4.8.3.5 Analysis of Alternatives

Impacts Common to All Alternatives

Implementing hazardous materials management activities will address human health and environmental risks from potential hazardous materials release or exposures. Any authorized use of hazardous materials adheres to federal and state requirements to reduce or eliminate impacts. Hazardous materials in the planning area are managed to reduce risks to visitors and employees, to restore contaminated lands, and to carry out emergency response activities, as per appropriate laws, policies, and regulations. An active remediation program remains in place under all alternatives. Indirect impacts related to risks from hazardous materials during remediation could exist.

Alternative A

Under Alternative A, activities will comply with the requirements of Onshore Order #6 for H_2S plans. Alternative A reduces the risk to humans and the environment from hazardous materials and waste in the planning area.

Alternative B

Under Alternative B, new H_2S wells will be prohibited within 2 miles of towns, cities, and designated campgrounds. Alternative B is the most restrictive for H_2S well placement and development; however, this alternative reduces risks to humans and the environment more than other alternatives.

Alternative C

Under Alternative C, H_2S requirements are the same as for Alternative A; therefore, impacts are expected to be similar.

Alternative D (Preferred Alternative)

Alternative D also has the same H_2S requirements as Alternative A; therefore, impacts are expected to be similar.

4.8.3.6 Conclusion

Under all alternatives, the risks from hazardous materials and waste are managed to reduce risk to people and the environment as discussed in Methods and Assumptions and as per HMRRP. An active remediation program remains in place under all alternatives. Alternatives A, C, and D are identical to each other with regard to new H_2S wells, but less restrictive than Alternative B. Therefore, alternatives A, C, and D may pose a slightly greater risk to the health and safety of towns, cities, and campgrounds than management actions under Alternative B.

4.8.4 Environmental Justice

This section addresses the potential for the alternatives to have disproportionate adverse impacts on minority and low-income populations, including direct, indirect, short-term, and long-term impacts. Because the analysis of disproportionate adverse impacts depends on what impacts are identified related

to other resources, definitions of adverse impacts as they apply to environmental justice issues are closely related to the definitions of adverse impacts in other resource areas (e.g., social resources). For example, the displacement of a mobile home park that houses a low-income population to build a new road could be a disproportionate direct impact. An example of a disproportionate indirect impact could be a reduction in social services to low-income individuals that may result from decreased tax revenues because of decreased mineral production.

4.8.4.1 Methods and Assumptions

Since the analysis of disproportionate adverse impacts is based on other resource impacts, the assumptions for this analysis also are based on the assumptions of other resource areas as they relate to the identification and analysis of impacts. In addition, this analysis assumes that if demographic data show that there are concentrations of minority and low-income populations in the planning area, then the adverse impacts on other resources would need to be identified and evaluated to determine if there would potentially be disproportionate adverse impacts.

In accordance with BLM and Council on Environmental Quality (CEQ) guidance for assessing environmental justice in the planning process, an area would be considered to contain a minority population if either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population. Since the minority population in each of the counties that overlap the planning area is lower than the statewide minority population, and the minority population in each of the counties does not exceed 50 percent, none of these areas is considered to contain a resident minority population. Based on the BLM and CEQ guidance relating to identifying low-income populations, there also are no low-income populations living in poverty in the planning area.

Although there are no Native American reservations in the planning area, the Wind River Indian Reservation is about 60 miles east of the eastern boundary of the planning area. The Cultural Resources section of this document addresses the cultural significance of sites in the planning area to members of tribes living in and near the planning area.

4.8.4.2 Analysis of Alternatives

Based on the definitions, methods, and assumptions described above, the potential impacts of the alternatives are described below.

Impacts Common to All Alternatives

Based on demographic conditions in the planning area and the direct and indirect impacts of the alternatives, there would be no identifiable environmental justice issues or direct or indirect impacts associated with any of the alternatives specific to any minority or low-income community or population as defined in Executive Order (EO) 12898 or BLM IM 2002-164 (BLM 2002f). While minority and low-income populations exist in the planning area, no particular BLM actions proposed in any of the alternatives have been identified as causing disproportionate adverse impacts on these populations. The BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.4.3 Conclusion

The alternatives would be identical with respect to potential impacts on minority and low income populations. No particular BLM actions proposed in any of the alternatives would potentially cause disproportionate adverse impacts on minority or low-income populations. The BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.9 Cumulative Impacts

The CEQ defines cumulative effects as follows:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).*

The following narrative describes the three components of this definition as they relate to this cumulative impact analysis: (1) incremental impact of the action when added to (2) impacts from all past, present, and (3) reasonably foreseeable future actions.

The first component, incremental impacts of the action (i.e., RMP revision), is described for each resource under the eight resource topics in Sections 4.1 to 4.8 as direct, indirect, short-term, and long-term. The second component, impacts from all past and present actions, is encompassed within the description of baseline conditions presented in Chapter 3 – Affected Environment. In other words, the description of the current affected environment reflects past and present actions. The third component, reasonably foreseeable future actions are identified in Table 4-18 and in Appendix M.

Table 4-18 identifies 13 projects anticipated to involve reasonably foreseeable future actions in or adjacent to the planning area. Twelve of the projects in Table 4-18 are land use plans or other types of programmatic documents that provide a framework for subsequent site-specific actions. The breakdown of these 13 projects by agency includes 4 BLM RMPs, 1 BLM Programmatic Wind-Energy EIS, 2 U.S. Forest Service (USFS) Land and Resource Management Plans, 3 County Land Use Plans, and 1 Wyoming State Transportation Plan. The remaining 2 projects include 1 site-specific project and 1 BLM IM.

The analysis of cumulative impacts serves to place the projected incremental impacts from the RMP alternatives in the context of past, present, and future impacts. Combining the projected impacts of RMP alternatives with past, present, and future impacts necessarily involves projections and limited analyses. Analyses are limited primarily due to incomplete documentation of all past and present impacts on private and public lands; challenges of predicting potential impacts for reasonably foreseeable future actions; programmatic and strategic nature of RMP alternatives; unknown nature and pace of resource uses and technological changes that could occur; and changing circumstances related to agency priorities, policies, and the economy. These limitations are addressed through the methods and assumptions described in the following section.

4.9.1 Methods and Assumptions

It is neither practical nor required to exhaustively analyze all possible cumulative impacts. Instead, CEQ (2005) indicates the cumulative impact analysis should focus on meaningful impacts. The BLM identified key planning issues (see Chapter 1) to focus the analysis of environmental consequences in Sections 4.1 to 4.8 on meaningful impacts. During the analysis of environmental consequences, the key planning issues were further refined to seven cumulative issues for discussion in this section. Cumulative issues were identified based on scoping input, reasonably foreseeable future actions, professional judgment, purpose and need of the action, planning criteria, and consideration of context and intensity of potential impacts. Particular attention was given to potential impacts to public health and safety, controversy, uniqueness of resources, potential for violation of legal standards or laws, and potential impacts to legally protected resources. To focus the scope of cumulative impact analyses, cumulative issues were considered in the context of baseline conditions (Chapter 3), the incremental impacts of

individual resources (Sections 4.1 to 4.8), reasonably foreseeable future projects in Table 4-18, and the following factors (as modified from CEQ 1997):

- Does the impacted resource have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance?
- Are reasonably foreseeable future actions anticipated to have environmental impacts similar to the incremental impacts identified for RMP alternatives?
- Have any recent or ongoing NEPA analyses of similar actions in the geographic area identified important adverse or beneficial cumulative impact issues?
- Has the impact to the resource been historically significant, such that the importance of the resource is defined by past loss, past gain, or investments to restore resources?

The cumulative impact analysis was further bounded by timeframe, geographic area, and analytical assumptions. The timeframe or temporal limits of the cumulative impact analysis was defined as the anticipated life of the RMP. This timeframe corresponds to projections for the desired outcomes (goals and objectives) described for alternatives (Chapter 2). The geographic area or spatial limits of the cumulative impacts analysis was generally defined as the planning area; however, the impact analysis area was expanded for highly mobile resources, such as air quality, and for future actions adjacent to the planning area anticipated to have similar environmental impacts.

The majority of projects identified in Table 4-18 is ongoing and generally provide a management framework for site-specific actions implemented during the life of the various projects. Site-specific actions that have already occurred (past) or are ongoing (present) are not considered in this cumulative impacts analysis. Instead, these past and present actions are described in the baseline described in Chapter 3 – Affected Environment. Only those reasonably foreseeable future actions stemming from the 13 projects identified in Table 4-18 and Appendix M are considered in this cumulative impacts analysis (CEQ 2005).

Because most of the projects identified in Table 4-18 are programmatic and (or) strategic in nature, the precise intensity or location of anticipated impacts typically cannot be quantified. Therefore, the projects in Table 4-18 are primarily used to address the four factors identified above. For more quantitative analysis, the BLM projected the anticipated surface disturbance and air emissions from non-BLM RFAs for the entire planning area (Appendix M). The estimates of RFAs in Appendix M are based on historic and trend information, as well as the proportion of public to nonpublic land in the planning area. In addition to estimating RFAs for BLM and non-BLM actions, Appendix M also projects surface disturbance as short-term and long-term. Long-term surface disturbance denotes the disturbed area remaining following reclamation. Table 4-19 summarizes projected surface disturbance for BLM and non-BLM RFAs identified in Appendix M.

In general, trend analysis was used to assess cumulative impacts for identified issues in terms of ranges or changes in direction from baseline conditions. In lieu of quantitative data, projections regarding resource values were made when necessary.

Table 4-18. Summary of Reasonably Foreseeable Future Actions and Management Plans

Reasonably Foreseeable Future Actions and Management Plans	Programmatic Project
BLM Pinedale Field Office Resource Management Plan (1988a)	Yes
BLM Green River Resource Management Plan (1997a)	Yes
BLM Salt Lake Field Office Resource Management Plan	Yes
BLM Pocatello Field Office Resource Management Plan (BLM 1987)	Yes
Final Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2005b)	Yes
BLM Instruction Memorandum 2001-102, Grasshopper and Mormon Cricket Control Program Changes (BLM 2001e)	Yes
BLM Moxa Arch Area Infill Gas Development Project EIS (BLM 2005m)	No
Bridger-Teton National Forest Land and Resource Management Plan (USFS 1990)	Yes
Wasatch-Cache National Forest Land and Resource Management Plan (USFS 2003)	Yes
Lincoln County Comprehensive Plan. Lincoln County Commissioners (2005)	Yes
Uinta County Comprehensive Plan. Uinta County Commissioners (2004)	Yes
Sweetwater County Comprehensive Plan. Sweetwater County Commissioners (2002)	Yes
Wyoming Department of Transportation Fiscal Year 2005 State Transportation Improvement Summary (WYDOT 2004)	Yes

Note: Full citations for each project are in Chapter 5 – References.
BLM Bureau of Land Management
EIS Environmental Impact Statement
USFS U.S. Forest Service
WYDOT Wyoming Department of Transportation

Because BLM does not manage or regulate non-BLM actions, certain assumptions were made in estimating cumulative impacts for non-BLM actions. Assumptions used in calculating impacts from non-BLM actions within the planning area follow.

1. For cumulative impacts associated with non-BLM oil and gas activities, calculations were based on the following percent federal and non-federal wells from the Kemmerer Oil and Gas Reasonable Foreseeable Development (BLM 2006b):
   - Baseline – 46 percent federal and 54 percent nonfederal
   - Alternative A – 41 percent federal and 59 percent nonfederal
   - Alternative B – 29 percent federal and 71 percent nonfederal
   - Alternative C – 41 percent federal and 59 percent nonfederal
   - Alternative D – 41 percent federal and 59 percent nonfederal
2. For cumulative impacts associated with non-BLM other activities (excluding oil, gas, and coal) the amount and density of activities was assumed the same for BLM and non-BLM actions, regardless of land ownership. The calculation of cumulative impacts for non-BLM other mineral actions (i.e., non-oil and gas) is based on 40-percent BLM-minerals and 60-percent non-BLM minerals in the planning area. The calculation of cumulative impacts for non-BLM other activities (i.e., nonmineral) is based on 36-percent BLM-administered surface and 64-percent non-BLM-administered surface in the planning area.
3. For cumulative air quality impacts associated with non-BLM trona processing, calculations were based on actual emissions from the five trona processing facilities in the planning area for 2001 (Bott 2006).

4. The context and intensity of non-BLM activities are not anticipated to vary by alternative because these activities do not directly depend on management actions and allowable uses set forth in RMP alternatives.

Table 4-19. Cumulative Surface Disturbance (Acres) from BLM and Non-BLM Reasonable Foreseeable Actions over the Life of the Plan in the Kemmerer Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Total Acres Short-Term Disturbance from BLM Actions	214,120	106,175	172,967	147,262
Total Acres Reclaimed from BLM Actions	69,447	58,482	28,500	69,721
Total Acres Long-Term Disturbance from BLM Actions	**144,673**	**47,693**	**144,467**	**77,541**
Total Acres Short-Term Disturbance from Non-BLM Actions	185,498	185,498	185,898	185,898
Total Acres Reclaimed from Non-BLM Actions	32,618	32,618	32,818	32,818
Total Acres Long-Term Disturbance from Non-BLM Actions	**152,880**	**152,880**	**153,080**	**153,080**
Cumulative Long-Term Disturbance from BLM and Non-BLM Actions	**297,553**	**200,573**	**297,547**	**230,621**

Source: Appendix M of this document, Table M-1
BLM Bureau of Land Management

Cumulative Impacts

Review of the EISs or associated plans for the 13 projects in Table 4-18 reveal that most reasonably foreseeable future actions from the projects could be expected to produce environmental impacts similar to the incremental impacts anticipated for the RMP alternatives. For example, when implemented, most projects in Table 4-18 are anticipated to involve surface-disturbing activities or will allow removal of vegetation and soil disturbance, similar to actions anticipated for RMP alternatives. Therefore, cumulative impacts such as soil erosion, spread of INNS, and habitat fragmentation are anticipated to be commensurate with the amount of surface disturbance projected within the planning area.

Some resources (i.e., cultural, special status species, air quality) that could be impacted by reasonably foreseeable future actions have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance. Exceedance of legal standards or thresholds protecting these resources is not anticipated from the cumulative impact of BLM and non-BLM actions; however, the programmatic nature of most RFAs prohibits precise prediction of cumulative impacts. Subsequent environmental impact analyses during implementation of management plans identified in Table 4-18 will include more precise site- and project-specific information.

The following cumulative impacts discussion is organized according to the seven cumulative issues identified during scoping to focus the cumulative impact analysis. Each issue is discussed in terms of the potential cumulative impact of BLM actions anticipated through implementing the revised plan and non-BLM actions anticipated to occur during the life of the plan.

Cumulative Issue 1 – The cumulative impact of surface-disturbing activities and the associated potential invasion and spread of INNS

The INNS section in this chapter describes how surface-disturbing activities and the disturbance of soil contribute to the spread of INNS. The Soil section describes potential impacts to soil from surface-disturbing activities and other activities that remove vegetation and disturb soil. RFAs that disturb soil are also anticipated to create potential habitats for INNS. In general, the more soil disturbed over the life of the plan, the greater the cumulative impact anticipated relative to INNS. While much of the area projected to be disturbed from BLM and non-BLM actions is anticipated to be reclaimed, the potential for the spread of INNS remains from both short- and long-term impacts (Table 4-19).

In addition to total acres of land disturbed, the type of disturbance is important to the spread of INNS. For example, construction, maintenance, existence, and operation of linear features (e.g., water courses, roads, trails, ROWs, and corridors) in the planning area could have a substantive impact on the spread of INNS. Water, wind, vehicles, livestock, humans, and wildlife inadvertently transport INNS along these linear features. Similar to surface disturbance, the greater the miles of linear features constructed, the greater the adverse cumulative impact from INNS.

Surface-disturbing activities are defined as the physical disturbance and movement or removal of the land surface and vegetation (see Glossary). In addition to surface-disturbing activities other surface-use activities may remove vegetation and disturb soil. OHV use, fire suppression, recreational activities, and dispersed travel may remove vegetation and disturb the soil surface. Improper grazing by livestock and native ungulates can reduce vegetative cover, exposing more soil to erosion. Surface-disturbing activities and surface uses can contribute to the spread of INNS.

Management actions associated with each alternative (see Chapter 2) afford some degree of reclamation following surface disturbance and some degree of protection of highly erodible soils or soils occurring on steep slopes. However, because of how they are formulated, these protective measures are anticipated to be more effective under some alternatives (e.g., Alternative B) and less effective under other alternatives (e.g., Alternative C). These protective measures may not apply to lands under state and fee (i.e., private) ownership. Moreover, protective measures may be applied unevenly across the planning area and enforcement and monitoring of protective measures depend on land ownership and funding. Some private lands are subject to local protective measures; however, the nature and extent of these measures are expected to vary for private lands within the planning area.

Similar to the impact analysis described in the INNS section, Table 4-19 supports the conclusion that cumulative surface disturbance acreage is anticipated to be the most under Alternative C and the least under Alternative B for the entire planning area. Likewise, due to management actions and restrictions, INNS spread associated with nonsurface-disturbing activities (i.e., livestock and native ungulate grazing, OHV use, fire, recreational activities, and dispersed travel) are anticipated to be the most under Alternative C and the least under Alternative B for lands managed by the BLM. Considering BLM and non-BLM actions, projected surface disturbance, nonsurface-disturbing activities, and management actions for alternatives, the projected INNS cumulative impacts in the planning area are anticipated to be highest and similar under alternatives A and C and lowest and similar under alternatives B and D.

Cooperation between the Sweetwater, Lincoln, Uinta, and Sublette County Weed and Pest Control Districts and the BLM is anticipated to continue throughout the life of this plan; however, the long-term effectiveness of INNS control measures on all public and private lands in the planning area depends on continued cooperation, available funding, agency priorities, and the effectiveness and periodic assessment of weed-management activities in accordance with a comprehensive weed-management plan. Unchecked INNS could overwhelm attempts at control and substantially impact fire and fuels management, biological resources, livestock grazing (by reducing rangeland productivity and AUMs, and recreation (by impacting wildlife habitats and scenic quality) throughout the planning area.

Cumulative Issue 2 – The cumulative impact of management actions and constraints on oil and gas development

The unconstrained RFD projection over the life of the plan is 2,680 new wells (76-percent oil and gas wells and 24-percent CBNG wells) in the planning area (BLM 2006b). During the RMP alternative formulation process, management actions and allowable uses were identified for individual resource programs, which spatially and temporally constrained and, thus, impacted mineral development. Constraints included deferring leasing, CSU restrictions, TLS, and stipulations on conditions of approval for application to drill. These constraints reduce the unconstrained estimated number of well locations, and, in general, increase development costs and reduce production in areas of federal oil and gas ownership.

The constraints identified above are not applied to nonfederal (state and fee minerals) wells. While other constraints may be applied to nonfederal wells, the impact of such constraints cannot be quantified for this analysis. The number of unconstrained baseline wells, constrained federal wells, and unconstrained nonfederal wells projected for each alternative over the life of the plan are summarized in Table 4-20.

Table 4-20. Reasonable Foreseeable Development Well Number Projections

Well Type	Baseline	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Number of Projected New Federal Wells	1,221	1,012	608	1,020	1,010
Projected Number of Abandoned New Federal Wells	190	146	88	156	152
Projected Productive New Federal Wells	1,031	866	520	864	858
Number of Projected New Nonfederal Wells	1,459	1,459	1,459	1,459	1,459
Projected Number of Abandoned New Nonfederal Wells	216	216	216	216	216
Projected Productive New Nonfederal Wells	1,243	1,243	1,243	1,243	1,243
Cumulative New Wells (Federal/Nonfederal)	2,680	2,471	2,067	2,479	2,469
Cumulative Abandoned New Wells (Federal/Nonfederal)	406	362	304	372	368
Cumulative Productive New Wells (Federal/Nonfederal)	2,274	2,109	1,763	2,107	2,101

The projected number of new nonfederal wells (1,459) is approximately 54 percent of the cumulative number of new wells (2,680) predicted for the planning area between 2001 and 2020. Restrictions placed on federal wells under the various alternatives reduce the number of new wells compared to the unconstrained baseline of 2,680 wells, as follows.

Percent reduction from baseline projected unconstrained new wells:

- Alternative A – 8 percent
- Alternative B – 23 percent
- Alternative C – 8 percent
- Alternative D – 8 percent

The cumulative impact of federal and nonfederal wells on surface disturbance and INNS, special status species, cultural resources, and social and economic conditions are described under the appropriate cumulative issue in this section.

Cumulative Issue 3 – The cumulative impact of water depletion on downstream special status species

Anticipated water depletions from BLM actions and the potential impacts to special status species are described in the Fish and Wildlife Resources – Fish, Special Status Species – Fish, and Water sections of this chapter. Water depletions from BLM actions are anticipated from development of oil and gas wells and livestock water sources. Water depletions from non-BLM actions also are anticipated from the development of oil and gas wells and livestock water sources, and are not expected to substantively vary by alternative. Table 4-21 shows the projected average annual water depletion from BLM and non-BLM actions within the planning area.

Table 4-21. Projected Cumulative Annual Water Depletion from BLM and Non-BLM Actions over the Life of the Plan

	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Projected Average Annual Depletion from BLM Actions (acre-feet)	96.9	59.1	97.7	96.9
Projected Average Annual Depletion from Non-BLM Actions (acre-feet)	148.2	148.2	148.2	148.2
Projected Cumulative Annual Depletion from BLM and Non-BLM Actions in the Planning Area (acre-feet)	245.10	207.30	245.90	245.10

BLM Bureau of Land Management

Table 4-21 does not include predictions of water depletions associated with urban development within the planning area. As population centers within the Colorado River System grow and larger tracts of land are subdivided into smaller, more numerous residential properties, water depletions within the Colorado River watershed are expected to increase irrespective of BLM-actions.

Because projected water depletions from BLM actions are similar and highest under alternatives A, C, and D, and because water depletions from non-BLM actions are not expected to vary by alternative, the greatest adverse cumulative water depletions are anticipated under alternatives A, C, and D, and the least adverse cumulative water depletions under Alternative B.

Cumulative Issue 4 – The cumulative impact of habitat fragmentation on wildlife and special status wildlife species

The condition of the planning area with respect to habitat fragmentation is described in the introduction of Biological Resources, Chapter 3. Potential impacts contributing to habitat fragmentation are described in the introduction of Biological Resources in this chapter. Potential impacts stemming from habitat fragmentation are described in appropriate biological resources sections (e.g., vegetation, wildlife), in this chapter.

The challenge of habitat fragmentation and associated impacts, primarily to biological resources, is anticipated to continue under all alternatives. Moreover, surface-disturbing activities, fire, spread of INNS, and activities that remove vegetation and disturb soil are anticipated to contribute to habitat

fragmentation within the planning area, regardless of land ownership. Habitat fragmentation from non-BLM actions in the planning area is primarily anticipated from wildland urban interface (WUI) development, energy development, and associated infrastructure (e.g., roads), although the intensity of development on private lands is not expected to vary by alternative. The majority of habitat fragmentation is anticipated to occur proximate to population centers (e.g., Kemmerer) and in the WUI, where private lands abut public ownership.

Supported by favorable economic conditions, population centers are expected to grow in both geographic area and population density over the life of the plan. The trend in western states of subdividing larger private parcels to support development of residential subdivisions and ranchettes (e.g., 35-acre parcels) is expected to continue and contribute to habitat fragmentation. As larger tracts of land adjacent to public lands are subdivided, the WUI and its associated issues (e.g., fragmentation, fire suppression, spread of INNS) are also expected to grow. As the WUI expands, some tracts of BLM-administered land may become disconnected or isolated from other native habitats and ultimately adversely impact planning area biological diversity. The fences, roads, spread of INNS, fire suppression, and changes in land use associated with an expanding WUI all serve to fragment habitat. In addition, multiple land owners in the WUI, and especially in the eastern planning area, are expected to result in varied management of resources and resource use impacting habitat fragmentation, including INNS spread, fire, wildlife, livestock grazing, OHV use, and development.

The most adverse cumulative habitat fragmentation impacts are anticipated under alternatives A and C because these alternatives will result in the most cumulative long-term disturbance and management actions associated with these alternatives do not limit habitat fragmentation. Alternatives A and C generally are anticipated to allow the most development with the least restrictions on BLM-administered lands. Based on the amount of BLM-administered land proposed for managing habitat fragmentation, alternatives B and D are anticipated to have the least adverse impact and alternatives A and C are expected to have the most adverse impact to habitat fragmentation. Although, for this analysis, habitat fragmentation from non-BLM actions are assumed to not vary across alternatives, the magnitude of fragmentation from non-BLM actions on private lands is expected to be greater than fragmentation on public lands. This conclusion is based on the fact that privately held land surface in the planning area is and will continue to be subject to fewer restrictions and more development compared to public lands.

Cumulative Issue 5 – The cumulative impact of development activities on the context and historical setting of cultural resources (including National Historic Trails)

The cumulative impact of development activities from BLM and non-BLM actions within the planning area is anticipated to adversely impact the context and historical setting of some cultural resources and NHTs. No quantitative data are available for assessing cumulative impacts to the contexts and historical settings of cultural resources and NHTs. Moreover, plan alternatives are not anticipated to result in measurable differences in impacts to historical settings from non-BLM actions.

In general, although cultural resources on public land enjoy legal protection, similar protection does not apply to cultural resources from private actions on private lands. Likewise, limited restrictions on public lands exist to protect the historical setting of cultural resources on public lands. Due to the mixture of public and private land ownership adjacent to other cultural resources such as NHTs, cumulative impacts to the historical setting are not regulated and are expected to continue. For example, although the BLM may elect to prevent surface occupancy within a defined distance from NHTs, no similar requirement applies to adjacent private lands. No basis exists for assuming any difference in cumulative impact of development activities on the historical setting of cultural resources and NHTs.

With increased development comes the potential to lose increasing amounts of scientific information derived from cultural resources, resulting in a cumulative net loss of historical context. In turn, this might lead to a diminished capacity to understand and evaluate issues of national heritage. Based solely on projected long-term disturbance (see Table 4-19) in the planning area, Alternatives A and C are anticipated to result in the most cumulative adverse impact on the context and historical setting of cultural resources. Similarly, Alternative B is anticipated to result in the least cumulative adverse impact on the context and historical setting of cultural resources. The anticipated cumulative adverse impact due to Alternative D is more than Alternative B and less than Alternatives A and C.

Cumulative Issue 6 – The cumulative impact of management actions and projected development on the economy of local communities

Cumulative impacts to economic conditions most likely are related to oil and gas activity and ranching and livestock grazing. The impacts of oil and gas drilling and production described in the economic impact section of this chapter relate to activities only on BLM-administered surface and federal mineral estate within the planning area. However, oil and gas activity on private and state land is estimated to constitute about 60 percent of oil and gas activity in alternatives A, C, and D, and about 70 percent of activity in Alternative B. Thus, when oil and gas activity on state and private land is taken into account, the reduction in overall activity in Alternative B – and associated earnings, employment, output, and projected tax revenues – is proportionally smaller (compared to the reduction in activity on federal lands only). Table 4-22 summarizes potential economic impacts due to estimated oil and gas activity on federal, state, and private lands.

Oil and gas development is driven primarily by variables outside of the BLM's control, including national and international energy prices, investment within the planning area, and business strategies of operators. In addition, oil and gas activity on state and private lands will be impacted by land management decisions of other agencies and individuals. Because the pace of development is unknown, actual cumulative impacts may differ from those projected in Table 4-22.

Because energy prices are the predominant force behind the pace of oil and gas development, some communities may experience boom and bust cycles as a result of fluctuations in energy prices. This can cause hardships to local populations because of the temporary increased demand for housing and community services. Infrastructure may be expanded during boom times, and loans or bonds to pay for expansion of infrastructure must still be repaid if the boom turns to a bust.

Increasing energy development, such as the recent expansion in oil and gas drilling and production, is likely to have substantive social impacts in larger cities in the planning area (e.g., Kemmerer and Evanston) and may also have substantive social impacts in less densely populated towns. Because much of the economy of the area is dependent on extractive industries, towns and cities may have difficulty absorbing the increase in population likely to result from the recent expansion in oil and gas development. However, increased oil and gas development will bring increased local and state tax revenues, which will to some extent, mitigate the increased demand for community services and infrastructure that more development will bring.

A potential for cumulative economic impacts related to livestock grazing and ranching also exists. Cattle and sheep ranchers in the planning area face increasing pressure from local land developers and market trends. The potential loss of BLM land currently available for grazing, in addition to pre-existing economic pressures, could result in some adverse economic impacts to some ranchers. The cumulative impact of INNS spread on private and public lands, and an associated reduction in forage could adversely impact livestock grazing.

Table 4-22. Cumulative (including state and private) Impacts of Oil and Gas Development over the Life of the Plan in the Kemmerer Planning Area[1]

Impact	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Annual Average Earnings	$52.6 - $54.4	$43.8 - $45.3	$52.7 - $54.5	$52.2 - $54.0
Annual Average Output	$865.7 - $871.8	$731.0 - $736.0	$866.8 - $872.9	$862.2 - $868.2
Net Present Value of Output	$7,543 - $7,605	$6,409 - $6,460	$7,552 - $7,614	$7,511 - $7,573
Annual Average Employment[2]	1,367 - 1,451	1,137 - 1,206	1,368 - 1,453	1,358 - 1,441
Annual Average Federal Tax Revenues[3]	$32.2	$20.5	$32.3	$31.9
Annual Average State Tax Revenues[3]	$36.9	$31.2	$36.9	$36.7
Annual Average Local Tax Revenues[3]	$38.7	$32.8	$38.7	$38.6

Source: Calculated using the IMPLAN model, as described in the text.

[1]All dollar values are in millions of year 2004 dollars and represent annual averages, except for the net present value of output, which is discounted at a 7-percent real discount rate, as recommended in OMB 2002. The range of estimated impacts for earnings, output, and employment represents the high and low scenarios for oil and gas drilling and completion, which are described in the Economic Impacts section. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

[2]Employment is in annual job equivalents and represents an annual average.

[3]Represents tax revenues from production only.

The cumulative impacts of BLM management actions is not anticipated to have long-term adverse impacts on livestock grazing on public lands, since the projected availability of federal AUMs is generally constant over the life of the plan. Non-BLM actions that remove private lands from livestock grazing (such as development and urbanization) could result in adverse cumulative economic and social impacts related to livestock grazing. However, given that impacts on grazing lands occur gradually over the life of this plan and would be spread over the planning area, adverse economic impacts on individual ranchers is not anticipated. On the other hand, even if economic impacts on ranchers are not substantial, the social impacts could be more significant because of the importance of ranching to the custom, culture, and history of communities in the planning area.

Cumulative Issue 7 – The cumulative impact of air quality on public health and welfare within the planning area and protected Class I areas outside the planning area

Base year and anticipated annual air emissions for the life of the plan are organized by project scenario and resource as shown in Tables 4-23 to 4-27 at the end of this chapter. These tables identify each anticipated emission category for: (1) projected BLM actions, (2) projected non-BLM actions, and (3) the cumulative total of these actions.

BLM and non-BLM RFAs are anticipated to increase emissions in the planning area over the life of the plan. For the planning area, the cumulative air quality impacts (as measured against national and state ambient air quality standards) are anticipated to be roughly the same on BLM and non-BLM-managed lands because it is assumed that the density of activities is the same in both areas. This conclusion also assumes that nearby operations on both BLM and non-BLM-managed lands would not combine to result in greater impacts on a local scale. Plumes from trona processing plants located on private land are currently visible on BLM-managed lands, especially during winter air inversions, and are expected to continue to be visible in the future. Although cumulative projected emissions under all alternatives are similar for PM_{10}, $PM_{2.5}$, and SO_x, emissions of NO_x, VOCs, and HAPs are projected to be lower under Alternative B, due to proposed development restrictions on BLM-managed land. Cumulative emissions within the planning area are not anticipated to result in air quality impacts that exceed national or state ambient air quality standards because the emission sources likely will be widely separated. Potential impacts to prevention of significant deterioration increments, visibility and atmospheric deposition in distant Class I National Wilderness Areas, may be substantial.

4.10 Irreversible and Irretrievable Commitment of Resources

Section 1502.16 of CEQ regulations requires that the discussion of environmental consequences include a description of "…any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented." An irreversible commitment of resources refers to decisions impacting the use of nonrenewable resources. For example, extraction and processing of sand and gravel as part of an aggregate mining operation is considered an irreversible commitment of salable minerals because once the minerals are extracted and processed, they cannot be renewed in the ground within a reasonable timeframe. An irretrievable commitment of resources refers to decisions resulting in the loss of production or use of a resource. For example, a decision not to treat woodlands encroaching into adjacent grassland habitat results in the irretrievable loss of forage production from the grassland community. This action is not irreversible, because once a treatment is applied, the forage production of the grassland is restored.

The decision to select one of the four alternatives described in this Draft RMP/EIS does not constitute an irreversible or irretrievable commitment of resources because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following the signing of the Record of Decision (ROD) for the RMP, subsequent implementation plans (activity- or project-specific) will be developed and implemented by the BLM. Implementing decisions requires appropriate project-specific planning, NEPA analysis, and BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, irreversible and irretrievable commitment of resources could occur to select resources. No irreversible or irretrievable commitment of resources are anticipated for air quality, geologic resources, fire and fuels management, vegetation, fish and wildlife, special status species, visual resources, lands and realty, renewable energy, rights-of-way and corridors, travel management, recreation, special designations, and social resources.

Physical, Biological, and Heritage Resources

Soil. Surface-disturbing activities, nonmechanized activities, and natural processes cause soil erosion in the planning area. Soil formation requires thousands of years to replenish. Eroded soil and lost productivity cannot be recovered. The loss of topsoil from soil erosion results in an irretrievable loss of soil productivity.

Water. Depletion of water to the Colorado River from BLM actions in the Bear, Green, and the Colorado watersheds may result in an irretrievable commitment of water that would otherwise have contributed to the Colorado River System. The production of water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater depending on its use once it reaches the surface.

Coal. Removal of coal from the ground is considered an irreversible commitment of these resources.

Fluid Minerals. Removal of oil and gas from the ground is considered an irreversible commitment of these resources.

Locatable Minerals. Removal of locatable minerals from the ground is considered an irreversible commitment of these resources.

Mineral Materials. Removal of mineral materials from the ground is considered an irreversible commitment of these resources.

Nonenergy Leasables. Removal of nonenergy leasable from the ground is considered an irreversible commitment of these resources.

Resource Uses

Forest Products. Any decision to prohibit silviculture treatments is an irretrievable commitment of the wood fiber produced. As trees grow older, ultimately die, and decompose, the wood fiber that was not treated is irretrievably lost.

Livestock Grazing. Forage utilized by livestock is unavailable for utilization by wildlife. Conversely, any decision to prohibit livestock grazing is an irretrievable commitment of the forage produced. As grasses and forbs grow older, ultimately die, and decompose, the forage that is not utilized is irretrievably lost for production of wildlife or livestock.

4.11 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the residual impacts of implementing management actions or allowable uses after BMPs and mitigation measures are applied.

The decision to select one of the four alternatives described in this Draft RMP/EIS would not result in unavoidable adverse impacts because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following signing of the ROD for the RMP, subsequent plans (activity- or project-specific) will be developed and implemented by BLM. Implementation decisions require appropriate project-specific planning and NEPA analysis and constitute BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, unavoidable adverse impacts could occur to select resources.

Surface-disturbing activities (e.g., construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining and mineral processing, and vegetation treatments), OHV use, fire and fuels management, some recreational activities, and operation and maintenance of existing facilities and infrastructure in the planning area will cause fugitive dust, exhaust emissions, and smoke, thereby adversely impacting air quality.

Surface-disturbing activities, OHV use, fire and fuels management, some recreational activities, uncontrolled animal concentrations, and operation and maintenance of existing facilities and infrastructure in the planning area may cause soil erosion and soil compaction. These same activities, in combination with precipitation events, also may result in runoff and sedimentation to existing surface waters. Additional unavoidable adverse impacts from these activities include transport and spread of INNS in the planning area. INNS will continue to spread via the wind, in water courses, and by attaching to livestock, wildlife, humans, and vehicles. The presence of INNS in the planning area is considered an unavoidable impact.

Surface-disturbing activities and the development of mineral, energy, and other facilities in the planning area are expected to cause the unavoidable degradation, loss, and fragmentation of habitats. OHV use, fire and fuels management, some recreational activities, concentrated livestock grazing, and operation and maintenance of existing facilities and infrastructure in the planning area may contribute to the unavoidable degradation, loss, and fragmentation of habitats.

Protection of some resource values (e.g., wildlife, special status species, cultural, and paleontological resources) will adversely impact the use of other resources, such as minerals and renewable energy. Conversely, use of minerals and renewable energy are expected to adversely impact the distribution of some wildlife, special status species, and vegetative communities.

Surface-disturbing activities and development from BLM actions unavoidably will change the landscape, scenic quality, and setting in the planning area. Non-BLM actions on lands adjacent to BLM-administered lands also will change the landscape and setting. Fire, insect and disease damage, and development also are expected to temporarily impact the scenic quality of the planning area. Surface-disturbing activities, OHV use, vandalism, and natural processes (e.g., fire and erosion) may adversely impact cultural and paleontological resources in the planning area.

Table 4-23. Cumulative Annual Emissions for BLM Activities within the Kemmerer Planning Area – Baseline Year 2001

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	113.70	163.61	277.31	68.76	98.94	167.70	869.86	1,251.74	2,121.60	62.88	90.49	153.38
Oil Development/Production	6.37	9.16	15.53	1.08	1.55	2.63	7.44	10.71	18.15	0.97	1.40	2.37
Locatable Minerals	1.22	1.83	3.06	0.96	1.45	2.41	17.28	25.93	43.21	0.41	0.62	1.03
Salable Minerals	289.59	434.39	723.99	34.00	51.00	85.00	20.35	30.52	50.87	0.23	0.34	0.57
Coal Mining	407.10	0.00	407.10	142.08	0.00	142.08	1,320.30	0.00	1,320.30	1.50	0.00	1.50
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.80	6.76	10.56	0.43	0.76	1.18	0.45	0.80	1.25	0.01	0.02	0.03
ROW Corridors	72.73	129.30	202.02	54.36	96.64	151.00	892.53	1,586.73	2,479.26	21.29	37.85	59.14
Livestock/Grazing	2.36	4.20	6.56	0.41	0.73	1.14	1.12	1.98	3.10	0.03	0.06	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.02	0.04	0.05	0.00	0.00	0.00
OHVs	7.11	12.63	19.74	7.11	12.63	19.74	2.99	5.31	8.29	0.00	0.00	0.00
Total	2,839.95	1,363.72	4,203.67	2,243.56	862.70	3,106.26	7,987.43	3,218.85	11,206.28	5,130.63	132.78	5,263.41

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	822.86	1,184.12	2,006.98	6,147.52	8,846.43	14,993.94	622.85	896.29	1,519.14
Oil Development/Production	2.01	2.89	4.89	0.27	0.39	0.66	0.03	0.04	0.07
Locatable Minerals	6.11	9.17	15.28	1.57	2.35	3.92	0.16	0.24	0.39
Salable Minerals	3.41	5.12	8.53	0.86	1.29	2.15	0.09	0.13	0.22
Coal Mining	285.10	0.00	285.10	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.14	0.26	0.40	0.04	0.06	0.10	0.00	0.01	0.01
ROW Corridors	328.28	583.60	911.88	84.72	150.62	235.34	8.47	15.06	23.53
Livestock/Grazing	0.52	0.92	1.43	0.12	0.22	0.34	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	0.05	0.09	0.14	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	433.98	771.52	1,205.50	233.50	415.12	648.62	23.35	41.51	64.86
Total	6,372.16	6,174.68	12,546.84	13,673.31	9,829.34	23,502.65	1,128.21	1,048.15	2,176.35

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_X nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_X sulfur oxides
VOC volatile organic compound

Table 4-24. Cumulative Annual Emissions Associated with Alternative A

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	19.07	27.44	46.51	6.50	9.35	15.85	27.41	39.44	66.85	0.21	0.30	0.50
Natural Gas Development/Production	176.93	254.60	431.53	98.40	141.61	240.01	1,248.57	1,796.73	3,045.30	79.39	114.24	193.63
Oil Development/Production	6.22	8.95	15.17	1.24	1.78	3.02	14.04	20.20	34.24	1.85	2.66	4.51
Locatable Minerals	0.63	0.95	1.58	0.37	0.56	0.94	9.08	13.62	22.70	0.08	0.12	0.20
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	7.10	12.61	19.71	1.07	1.90	2.97	0.01	0.02	0.04	0.00	0.00	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Project Year 2011 Total	4,209.03	3,689.65	7,898.68	2,461.04	1,209.22	3,670.26	8,123.05	3,063.12	11,186.18	5,130.55	126.53	5,257.09

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	45.95	66.13	112.09	22.56	32.46	55.01	3.59	5.16	8.75
Natural Gas Development/Production	1,140.15	1,640.70	2,780.85	5,201.25	7,484.72	12,685.97	531.66	765.08	1,296.74
Oil Development/Production	3.64	5.24	8.88	0.48	0.69	1.17	0.05	0.07	0.12
Locatable Minerals	2.36	3.54	5.90	0.56	0.83	1.39	0.06	0.08	0.14
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.27	0.48	0.75	0.09	0.15	0.24	0.01	0.02	0.02
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Project Year 2011 Total	7,363.85	7,759.41	15,123.26	12,921.02	8,805.20	21,726.22	1,057.75	952.61	2,010.36

Table 4-24. Cumulative Annual Emissions Associated with Alternative A (Continued)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	34.18	49.18	83.35	13.73	19.76	33.49	59.86	86.14	146.00	0.27	0.39	0.67
Natural Gas Development/Production	209.98	302.17	512.16	122.09	175.69	297.77	1,544.54	2,222.62	3,767.16	80.97	116.51	197.48
Oil Development/Production	7.00	10.07	17.08	1.34	1.93	3.26	14.55	20.94	35.50	1.91	2.75	4.66
Locatable Minerals	0.37	0.55	0.92	0.11	0.16	0.27	0.78	1.16	1.94	0.08	0.12	0.20
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	7.10	12.61	19.71	1.07	1.90	2.97	0.01	0.02	0.04	0.00	0.00	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Project Year 2020 Total	3,053.27	1,618.50	4,671.77	2,299.50	911.66	3,211.16	8,031.24	2,792.07	10,823.31	5,132.17	128.82	5,084.61

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	111.33	160.21	271.55	55.18	79.40	134.58	8.81	12.67	21.48
Natural Gas Development/Production	1,456.72	2,096.26	3,552.99	5,342.05	7,687.34	13,029.40	549.10	790.17	1,339.28
Oil Development/Production	3.74	5.38	9.13	0.51	0.73	1.24	0.05	0.07	0.12
Locatable Minerals	0.60	0.91	1.51	0.39	0.58	0.96	0.04	0.06	0.10
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.23	0.40	0.63	0.04	0.07	0.11	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Project Year 2020 Total	7,918.51	8,616.83	16,535.34	13,174.55	9,197.26	22,371.81	1,088.42	999.47	2,087.89

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-25. Cumulative Annual Emissions Associated with Alternative B

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	9.10	13.10	22.20	3.14	4.52	7.67	13.20	19.00	32.21	0.10	0.14	0.24
Natural Gas Development/Production	142.77	205.44	348.21	82.31	118.45	200.76	1,043.22	1,501.22	2,544.44	51.90	74.69	14.73
Oil Development/Production	5.95	8.56	14.51	1.10	1.58	2.68	10.20	14.68	24.89	1.34	1.93	3.27
Locatable Minerals	0.32	0.48	0.79	0.19	0.28	0.47	4.54	6.81	11.35	0.04	0.06	0.10
Salable Minerals	269.98	404.97	674.95	31.45	47.18	78.64	13.90	20.85	34.75	0.03	0.04	0.07
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	40.98	72.85	113.83	22.69	40.35	63.04	477.47	848.83	1,326.29	3.90	6.93	10.83
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	5.68	10.09	15.77	0.86	1.52	2.38	0.01	0.02	0.03	0.00	0.00	0.01
Vegetation Management	0.83	1.48	2.31	0.13	0.22	0.35	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Project Year 2011 Total	4,142.47	3,591.81	7,734.28	2,438.66	1,176.74	3,615.40	7,894.04	2,733.21	10,627.24	5,102.40	86.02	5,188.42

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	22.28	32.07	54.35	10.94	15.74	26.68	1.74	2.51	4.25
Natural Gas Development/Production	975.75	1,404.12	2,379.87	4,035.79	5,807.60	9,843.38	413.54	595.09	1,008.63
Oil Development/Production	2.68	3.86	6.54	0.36	0.51	0.87	0.04	0.05	0.09
Locatable Minerals	1.18	1.77	2.95	0.28	0.42	0.69	0.03	0.04	0.07
Salable Minerals	1.12	1.69	2.81	0.32	0.49	0.81	0.03	0.05	0.08
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.35	249.50	389.85	33.26	59.13	92.39	3.33	5.91	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.22	0.39	0.60	0.07	0.12	0.19	0.01	0.01	0.02
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Project Year 2011 Total	7,173.42	7,485.27	14,658.69	11,743.48	7,110.66	18,854.14	937.74	779.90	1,717.63

Table 4-25. Cumulative Annual Emissions Associated with Alternative B (Continued)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	16.21	23.33	39.54	6.52	9.38	15.90	28.29	40.71	69.01	0.13	0.19	0.31
Natural Gas Development/Production	159.83	230.00	389.82	94.53	136.02	230.55	1,195.34	1,720.12	2,915.46	52.72	75.86	128.58
Oil Development/Production	6.67	9.60	16.27	1.19	1.71	2.90	10.70	15.40	26.10	1.40	2.02	3.42
Locatable Minerals	0.18	0.28	0.46	0.05	0.08	0.14	0.39	0.58	0.97	0.04	0.06	0.10
Salable Minerals	269.84	404.76	674.60	31.32	46.97	78.29	9.57	14.36	23.93	0.03	0.04	0.07
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.58	43.69	68.27	6.29	11.19	17.48	70.41	125.18	195.59	3.90	6.93	10.83
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	5.68	10.09	15.77	0.86	1.52	2.38	0.01	0.02	0.03	0.00	0.00	0.01
Vegetation Management	0.83	1.48	2.31	0.13	0.22	0.35	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Project Year 2020 Total	2,962.81	1,486.26	4,449.07	2,261.93	857.32	3,119.25	7,645.48	2,236.88	9,882.36	5,103.21	87.15	5,190.36

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	52.68	75.81	128.50	26.11	37.57	63.68	4.17	6.00	10.16
Natural Gas Development/Production	1,139.25	1,639.40	2,778.65	3,625.47	5,217.14	8,842.62	374.25	538.55	912.80
Oil Development/Production	2.78	4.00	6.77	0.38	0.55	0.93	0.04	0.05	0.09
Locatable Minerals	0.30	0.45	0.76	0.19	0.29	0.48	0.02	0.03	0.05
Salable Minerals	0.17	0.25	0.42	0.17	0.25	0.41	0.02	0.02	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.44	57.66	90.10	19.34	34.38	53.72	1.93	3.44	5.37
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.18	0.32	0.50	0.03	0.06	0.09	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Project Year 2020 Total	7,540.99	8,073.51	15,614.50	11,428.54	6,684.69	18,113.23	908.89	741.11	1,650.00

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-26. Cumulative Annual Emissions Associated with Alternative C

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	18.52	26.66	45.18	6.23	8.97	15.20	26.20	37.70	63.89	0.20	0.29	0.50
Natural Gas Development/Production	177.15	254.93	432.08	98.57	141.84	240.41	1,250.62	1,799.67	3,050.30	79.48	114.37	193.85
Oil Development/Production	6.22	8.95	15.17	1.24	1.78	3.02	14.04	20.20	34.24	1.85	2.66	4.51
Locatable Minerals	0.63	0.95	1.58	0.37	0.56	0.94	9.08	13.62	22.70	0.08	0.12	0.20
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	0.53	0.94	1.46	0.11	0.19	0.30	0.15	0.27	0.42	0.01	0.02	0.02
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.05	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Project Year 2011 Total	4,142.23	3,570.99	7,713.22	2,450.96	1,191.33	3,642.29	8,123.77	3,064.12	11,187.89	5,130.64	126.66	5,257.30

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	43.52	62.63	106.15	21.35	30.72	52.07	3.40	4.89	8.28
Natural Gas Development/Production	1,142.32	1,643.83	2,786.16	5,217.36	7,507.91	12,725.27	533.30	767.43	1,300.72
Oil Development/Production	3.64	5.24	8.88	0.48	0.69	1.17	0.05	0.07	0.12
Locatable Minerals	2.36	3.54	5.90	0.56	0.83	1.39	0.06	0.08	0.14
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.10	1.95	3.05	0.45	0.80	1.24	0.04	0.08	0.12
Forest and Woodlands	0.33	0.58	0.91	0.10	0.19	0.29	0.01	0.02	0.03
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Project Year 2011 Total	7,363.58	7,759.03	15,122.61	12,935.93	8,826.65	21,762.58	1,059.19	954.68	2,013.87

Table 4-26. Cumulative Annual Emissions Associated with Alternative C (Continued)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	33.36	48.01	81.38	13.34	19.20	32.55	58.11	83.62	141.73	0.27	0.39	0.66
Natural Gas Development/Production	210.44	302.82	513.26	122.41	176.15	298.57	1,548.63	2,228.51	3,777.14	81.07	116.66	197.73
Oil Development/Production	7.00	10.08	17.08	1.34	1.93	3.26	14.55	20.94	35.50	1.91	2.75	4.66
Locatable Minerals	0.37	0.55	0.92	0.11	0.16	0.27	0.78	1.16	1.94	0.08	0.12	0.20
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	1,190.86	2,117.09	3,307.95	178.71	317.70	496.40	0.57	1.02	1.59	0.10	0.18	0.27
Fire Management	0.52	0.93	1.45	0.11	0.19	0.29	0.05	0.09	0.14	0.01	0.02	0.02
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.04	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Project Year 2020 Total	4,177.29	3,616.88	7,794.17	2,468.17	1,211.53	3,679.70	8,034.13	2,796.42	10,830.56	5,132.36	129.13	5,261.49

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	107.83	155.17	262.99	53.43	76.89	130.33	8.53	12.27	20.80
Natural Gas Development/Production	1,461.06	2,102.50	3,563.57	5,366.38	7,722.35	13,088.73	551.58	793.74	1,345.32
Oil Development/Production	3.74	5.38	9.13	0.51	0.73	1.24	0.05	0.07	0.12
Locatable Minerals	0.60	0.91	1.51	0.39	0.58	0.96	0.04	0.06	0.10
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	1.46	2.60	4.06	0.33	0.59	0.93	0.03	0.06	0.09
Fire Management	0.92	1.63	2.55	0.27	0.49	0.76	0.03	0.05	0.08
Forest and Woodlands	0.27	0.48	0.76	0.05	0.08	0.13	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Project Year 2020 Total	7,920.80	8,620.63	16,541.43	13,197.46	9,230.34	22,427.80	1,090.66	1,002.69	2,093.35

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-27. Cumulative Annual Emissions Associated with Alternative D (Preferred Alternative)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	18.52	26.66	45.18	6.23	8.97	15.20	26.20	37.70	63.89	0.20	0.29	0.50
Natural Gas Development/Production	176.62	254.17	430.79	98.19	141.29	239.48	1,245.83	1,792.78	3,038.61	79.27	114.07	193.33
Oil Development/Production	6.22	8.95	15.17	1.24	1.78	3.02	14.04	20.20	34.24	1.85	2.66	4.51
Locatable Minerals	0.32	0.48	0.79	0.19	0.28	0.47	4.54	6.81	11.35	0.04	0.06	0.10
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.05	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Project Year 2011 Total	4,209.29	3,690.48	7,899.77	2,460.58	1,208.62	3,669.21	8,114.56	3,050.63	11,165.19	5,130.39	126.30	5,256.69

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	43.52	62.63	106.15	21.35	30.72	52.07	3.40	4.89	8.28
Natural Gas Development/Production	1,137.24	1,636.52	2,773.76	5,179.81	7,453.87	12,633.68	529.49	761.95	1,291.43
Oil Development/Production	3.64	5.24	8.88	0.48	0.69	1.17	0.05	0.07	0.12
Locatable Minerals	1.18	1.77	2.95	0.28	0.42	0.69	0.03	0.04	0.07
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.33	0.58	0.91	0.10	0.19	0.29	0.01	0.02	0.03
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Project Year 2011 Total	7,357.38	7,750.05	15,107.43	12,898.11	8,772.22	21,670.33	1,055.36	949.16	2,004.52

Table 4-27. Cumulative Annual Emissions Associated with Alternative D (Preferred Alternative) (Continued)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	33.32	47.94	81.26	13.33	19.19	32.52	58.08	83.58	141.66	0.27	0.39	0.66
Natural Gas Development/Production	209.55	301.55	511.10	121.78	175.24	297.02	1,540.63	2,217.00	3,757.63	80.84	116.33	197.17
Oil Development/Production	7.00	10.07	17.07	1.34	1.93	3.26	14.55	20.94	35.49	1.91	2.75	4.66
Locatable Minerals	0.18	0.28	0.46	0.05	0.08	0.14	0.39	0.58	0.97	0.04	0.06	0.10
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	595.98	1,059.52	1,655.50	89.44	159.00	248.44	0.30	0.53	0.83	0.05	0.09	0.14
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.04	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Project Year 2020 Total	3,649.19	2,678.40	6,327.60	2,388.39	1,069.93	3,458.32	8,025.47	2,783.85	10,809.32	5,132.05	128.66	5,260.71

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	107.77	155.09	262.86	53.41	76.85	130.26	8.52	12.27	20.79
Natural Gas Development/Production	1,452.58	2,090.30	3,542.88	5,328.18	7,667.38	12,995.57	547.67	788.12	1,335.79
Oil Development/Production	3.74	5.38	9.13	0.51	0.73	1.24	0.05	0.07	0.12
Locatable Minerals	0.30	0.45	0.76	0.19	0.29	0.48	0.02	0.03	0.05
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.77	1.37	2.13	0.17	0.31	0.49	0.02	0.03	0.05
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.27	0.48	0.76	0.05	0.08	0.13	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Project Year 2020 Total	7,911.32	8,606.74	16,518.05	13,158.90	9,174.79	22,333.69	1,086.71	997.00	2,083.71

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

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CHAPTER 5
REFERENCES

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CHAPTER 6
LIST OF PREPARERS

List of Preparers

Name	Education (degree, year, school)	Title	Project Role	Years of Experience
Bureau of Land Management				
Mary Jo Rugwell	BA Business Administration, 1987, Chapman University; MA Public Administration, 1991, University of Wyoming	Kemmerer Field Manager	Project Oversight	23
Michele Easley	BS Honors Range Management, 1993, University of Wyoming	RMP Project Manager	Project management, technical planning and NEPA procedural guidance and assistance; overall coordination with contractors, state government, and other cooperating agencies	15
James Roberts	BS Wildlife Biology, 6/1999, Colorado State University; BS Fisheries Biology, 12/1999, Colorado State University	Natural Resource Specialist	Soils, Hazmat, Oil and Gas Surface Protection	7
Roy L. Allen	BS Chemistry, 1969, Colorado State University; MS Economics, 1973, Colorado State University; PhD Economics, 1976, Colorado State University	Economist	Socioeconomics	30
Kelly Lamborn	To be added	Realty Specialist	Lands and Realty	20
Matthew Warren	BS Mechanical Engineering, 2003, New Mexico State University	Petroleum Engineer	Oil and Gas	6
John M. Henderson	BS Wildlife Science,1975, Utah State University; MS Zoology, 1982, Brigham Young University	Fishery Biologist	Fisheries	28
Susan Caplan	BS Meteorology, 1984, San Jose State University; MS Watershed Science, 1999, Colorado State University	Physical Scientist: Meteorologist/Air Resources Specialist	Air Quality	22
Gary McNaughton	BS Geology, 1974, Denison University	Geologist	Geology, Minerals, Paleontology, Geologic Hazards	28
Dale E. Wondercheck	BS Wildlife Biology, 1968, Washington State University; MS Range Management, 1972, Washington State University	Wildlife Biologist	Wildlife	35
Dennis Doncaster	BA Physical Science, 1985, California State University at Chico; MS Natural Resources, 1994, Humboldt State University	Hydrologist	Water Resources, Riparian Vegetation	18
Lynn Harrell	BA Anthropology, 1976, University of Texas at Austin; MA Anthropology, 1983, University of Texas at Austin	Archeologist	Cultural Resources, National Historic Trails, Native American Concerns	19
Pat Netherly	BS Forest Management/Ecology, 1977, Utah State University	Range Management Specialist	Livestock Grazing, Vegetation	29
Lara Oles	BS Natural Resources Management, 1989, University of Michigan - Ann Arbor	Wildlife Biologist	Wildlife, Special Status Species Wildlife	18
Neil Schiche	BS Wildlife Biology, 1973, Colorado State University; Post Bach. Work Forest Economics, 1979, University of Montana	Zone Forester	Vegetation, Forest Resources	28

List of Preparers

Name	Education (degree, year, school)	Title	Project Role	Years of Experience
Daniel Oles	BS Natural Resources Management, 1987, University of Michigan - Ann Arbor	GIS Specialist	Spatial Data Administration	15
Gavin Lovell	BS Range/Wildlife Management, 1992, Utah State University	Fire Fuels Specialist	Fire Management and Ecology	15
Mike Mischloney	BS Range Science, 1987, Montana State University	Range Management Specialist	Livestock Grazing	19
Carl Bezanson	BS Botany/Range/Wildlife, 1975, Southern Utah State College (Southern Utah University); Post Bach Work Range Management, 1978, Utah State University	Range Management Specialist	Invasive Non-native Species, Riparian, Livestock Grazing	29
Jim Glennon	BS Biology, 1982, Idaho State University; MS Botany, 1991, Idaho State University	Botanist	Vegetation, Special Status Species Plants	27
Wally Mierzejewski	BS Environmental Science, 1977, University of Connecticut	Outdoor Recreation Planner	Recreation, Travel Management, Visual Resources	22
Consultant				
Science Applications International Corporation (SAIC) – Interdisciplinary Team				