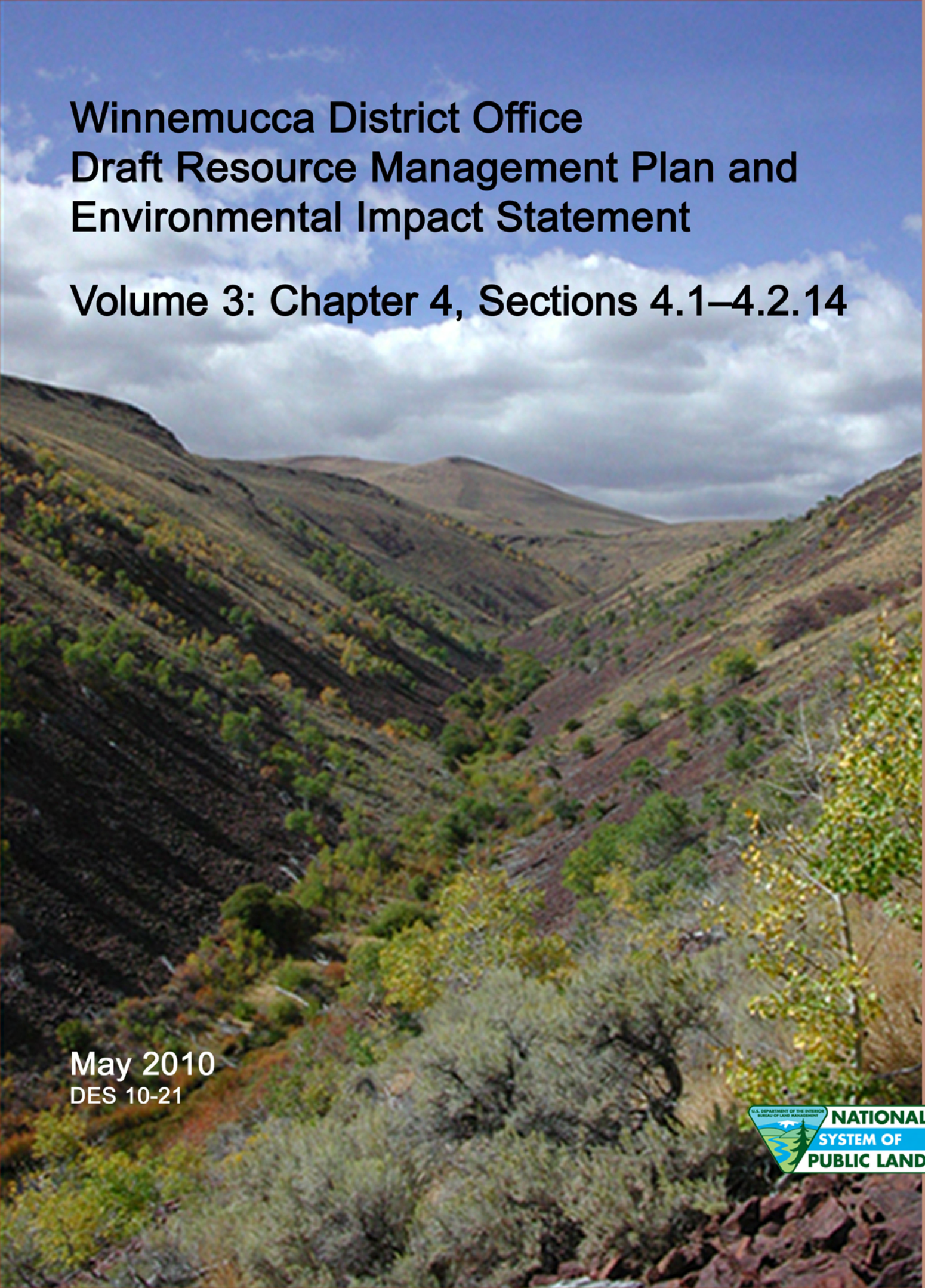


Winnemucca District Office Draft Resource Management Plan and Environmental Impact Statement

Volume 3: Chapter 4, Sections 4.1–4.2.14

May 2010

DES 10-21

BLM

Winnemucca District Office / Nevada

NATIONAL SYSTEM OF PUBLIC LANDS

VOLUME 3: CHAPTER 4, SECTIONS 4.1 - 4.2.14

TABLE OF CONTENTS

Section Page

4. ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Introduction 4-1

4.1.1 Analytical Assumptions 4-1
4.1.2 Types of Effects (Direct, Indirect, and Cumulative) 4-2
4.1.3 Cumulative Impacts 4-2
4.1.4 Incomplete or Unavailable Information 4-6

4.2 Resources 4-7

4.2.1 Air Quality 4-7
4.2.2 Geology 4-41
4.2.3 Soil Resources 4-49
4.2.4 Water Resources 4-63
4.2.5 Vegetation—Forest/Woodland Products 4-114
4.2.6 Vegetation—Weeds 4-141
4.2.7 Vegetation—Rangelands 4-167
4.2.8 Vegetation—Riparian Habitat and Wetlands 4-192
4.2.9 Fish and Wildlife 4-216
4.2.10 Special Status Species 4-246
4.2.11 Wild Horse and Burro 4-282
4.2.12 Wildland Fire Management 4-303
4.2.13 Cultural Resources 4-326
4.2.14 Paleontological Resources 4-361

LIST OF FIGURES

Figure Page

4-1 Cumulative Impact Analysis – Region of Influence 4-4

LIST OF TABLES

Table Page

4-1 Summary of Effects on Air Quality—Alternatives A, B, C, and D 4-8
4-2 Estimated Annual Greenhouse Gas Emissions from Wild Horses and Burros in the WDO Area 4-17
4-3 Historical Wildland Fire Emissions in the WDO Area 4-19
4-4 Smoke Impact from Fires in Western Annual Grass Vegetation 4-21
4-5 Smoke Impact from Fires in Sagebrush with Grass Vegetation 4-23
4-6 Estimated Annual Greenhouse Gas Emissions from Livestock Grazing in the WDO Area 4-29
4-7 Forest and Woodland Acreage Open to Mineral Development 4-132
4-8 Forest and Woodland Acreage Closed to Mineral Development 4-132
4-9 Special Status Species Habitat Designated as Suitable for Allowing Fire for Resource Benefit 4-265

LIST OF ACRONYMS

Acronym or Abbreviation	Full Phrase
ACEC	area of critical environmental concern
AFY	acre-feet per year
AML	appropriate management level
AMP	allotment management plan
APHIS	Animal and Plant Health Inspection Service
APHIS-WS	Animal and Plant Health Inspection Service-Wildlife Services
AQ	air quality
ATV	all-terrain vehicle
AUM	animal unit month
BCB	Backcountry Byways
BEA	Bureau of Economic Analysis
BIA	US Department of the Interior, Bureau of Indian Affairs
BLM	US Department of the Interior, Bureau of Land Management
BMPs	best management practices
BPS	budget planning system
BRDHRCET	Black Rock Desert High Rock Canyon Emigrant Trails
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CK	cave and karst resources
CNHT	California National Historic Trail
CR	cultural resources
CWA	Clean Water Act
CWPP	Community Wildfire Protection Plan
CWMA	Cooperative Weed Management Area
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	US Environmental Protection Agency
ERMA	extensive recreation management area
ES	Executive Summary
ESA	Endangered Species Act of 1973
ES&R	emergency stabilization and rehabilitation
FLPMA	Federal Land Policy and Management Act
FLTFA	Federal Land Transaction Facilitation Act
FMU	Fire Management Unit
FMUD	final multiple use decision
FOFEM	First Order Fire Effects Model
FPA	fire program analysis
FRCC	fire regime condition class
FW	fish and wildlife
G	geology
GAWS	general aquatic wildlife survey
GIS	geographical information system
HA	herd area

LIST OF ACRONYMS *(continued)*

Acronym or Abbreviation	Full Phrase
HAP	hazardous air pollution
HMA	herd management area
HMAP	herd management area plan
HMP	habitat management plan
HUA	herd use area
HVH	high value habitat
IBLA	Interior Board of Land Appeals
IDT	interdisciplinary team
IMP	interim management policy
IPM	Integrated Pest Management
ISA	instant study area
ITA	Indian Trust Assets
KGRA	known geothermal resource area
LCT	Lahontan cutthroat trout
LG	livestock grazing
LR	lands and realty
MACT	maximum available control technology
MBTA	Migratory Bird Treaty Act
MFP	management framework plan
MIST	minimum impact suppression tactics
MOU	memorandum of understanding
MR	minerals: leasable, locatable, salable
NASA	National Aeronautics and Space Administration
NCA	National Conservation Area
NDEP	Nevada Division of Environmental Protection
NDOA	Nevada Department of Agriculture
NDOM	Nevada Division of Minerals
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDVI	Normalized Difference Vegetation Index
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act of 1969
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NGO	non-government organizations
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NRCS	US Department of Agriculture, Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	new source review
NSO	no surface occupancy
NWSRS	National Wild and Scenic River Systems
NV	Nevada

Acronym or Abbreviation	Full Phrase
OCTA	Oregon-California Trail Association
OHV	off-highway vehicle
ORV	Outstanding Remarkable Value
PE	chemical and biological control
PFC	proper functioning condition
planning area	Winnemucca District Office boundary and scope for the RMP
$PM_{2.5}$	particulate matter smaller than 2.5 microns in diameter
PM_{10}	particulate matter smaller than 10 microns in diameter
PMU	population management unit
ppm	part per million
PR	paleontological resources
PS	public health and safety
PSD	prevention of significant deterioration
R	recreation
R&PP	Recreation and Public Purposes Act
RAC	resource advisory council
RAMS	risk assessment and mitigation strategy
RE	renewable energy
RFDS	Reasonably Foreseeable Development Scenario
RIP	range improvement project
RMIS	Recreation Management Information System
RMP	resource management plan
RMZ	recreation management zone
RNA	Research Natural Area
ROD	record of decision
ROI	region of influence
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
S	soils
SASEM	Simple Approach Smoke Estimation Model
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SNPLMA	Southern Nevada Public Land Management Act
SOG	standard operating guideline
SOP	standard operating procedure
SRMA	special recreation management area
SRP	special recreation permit
SSS	special status species
T&E	threatened and endangered
TA	transportation and access
TC	tribal consultation
TCP	traditional cultural property
TDS	total dissolved solids
TM	transportation and travel management
TNEB	thriving natural ecological balance

Acronym or Abbreviation	Full Phrase
TNR	temporary nonrenewable
TSP	total suspended particles
TSS	total suspended solids
US	United States
USC	United States Code
USDI	United States Department of the Interior
USFS	United States Department of Agriculture, Forest Service
USFWS	US Department of the Interior, Fish and Wildlife Service
USGS	US Geological Survey
VF	vegetation forest and woodland products
VR	vegetation rangelands
VRI	visual resource inventory
VRM	visual resource management
VRW	vegetation riparian and wetlands
VW	vegetation weeds
WA	wilderness area
WAFWA	Western Association of Fish and Wildlife Agencies
WD	Winnemucca District
WDM	wildlife damage management
WDO	Winnemucca District Office
WFDSS	Wildland Fire Decision Support System
WFM	wildland fire ecology management
WFSA	wildland fire situation analysis
WHB	wild horses and burros
WR	water resources
WSA	wilderness study area
WSR	wild and scenic river
WUG	Western Utility Group
WUI	Wildland Urban Interface
WWV	watchable wildlife viewing site

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 presents the direct, indirect, and cumulative impacts on the human and natural environment in terms of environmental, social, and economic consequences that are projected to occur from implementing the alternatives presented in Chapter 2. Separate sections describing irretrievable or irreversible commitment of resources and unavoidable adverse impacts are presented at the end of the chapter.

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources and planning area, information provided by experts in the BLM and Tetra Tech or in other agencies, and information contained in pertinent literature. The baseline used for the impact analysis is the current condition or situation, as described in Chapter 3 (Affected Environment). Analysis assumptions have also been developed to help guide the determination of effects (see Section 4.1.1, Analytical Assumptions). Because the Proposed RMP/EIS provides a broad management framework, the analysis in this chapter represents best estimates of impacts because exact locations of development or management are often unknown. Impacts are quantified to the extent practical with available data. In the absence of quantitative data, best professional judgment provides the basis for the impact analysis.

The land use planning-level decisions that the BLM will make regarding this RMP are programmatic decisions based on analysis that can only be conducted on a broad scale. Because of the broad scope, impact analysis of planning-level decisions is speculative with respect to projecting specific activities. Subsequent documents tiered to this RMP would generally contain a greater level of detail and would be subject to NEPA analysis and compliance. Subsequent tiered activity- and project-level plans are more definitive than plans found in an RMP. An activity-level plan typically describes projects in detail that will lead to on-the-ground action and traditionally focused on single resource programs. A project-specific plan is typically prepared for an individual project or several related projects. Activity plans (such as travel management plans) are generally more site specific and less speculative than the RMP analyses. Project-level plans (such as stream restoration) contain specific proposed actions, and site- or area-specific analysis is conducted. Activity plans may contain information that is as detailed or specific at a project level.

4.1.1 Analytical Assumptions

Several assumptions were made to facilitate the estimation of the effects of the alternatives. These assumptions are made only for the purpose of analysis and do not represent potential RMP decisions. The assumptions do provide reasonably foreseeable projected levels of development that could occur within the planning area. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative described in Chapter 2. Following are the general assumptions applicable to all resource categories. Any specific resource assumptions are provided in the Methods of Analysis subheading for that resource.

- Sufficient funding and BLM personnel would be available for implementing the final decision;

- Implementing actions from any of the RMP alternatives would comply with all valid existing rights, federal regulations, BLM policies, and other requirements;
- Local climate patterns of historic record and related conditions for plant growth would continue;
- The functional capability of all developments would be maintained;
- The discussion of impacts is based on the best available data. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data are limited;
- Acreage figures and other numbers used in the analyses are approximate projections for comparative and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations; and
- Acreages were calculated using GIS technology, and there may be slight variations in total acres between resources. These variations are negligible and will not affect analysis.

4.1.2 Types of Effects (Direct, Indirect, and Cumulative)

Direct, indirect, and cumulative impacts are considered in this effects analysis, consistent with direction provided in 40 CFR 1502.16. Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place. Indirect impacts result from implementing an action or alternative but are usually later in time or removed in distance and are reasonably certain to occur. Cumulative effects are defined below in Section 4.1.3, Cumulative Impacts.

Effects are quantified where possible, primarily by using GIS applications. In the absence of quantitative data, best professional judgment prevailed; impacts are sometimes described using ranges of potential impacts or in qualitative terms. Only management programs with impacts are discussed. Unless otherwise identified, analyses of the effects under Alternative C (Option 1 and 2), where the effects are the same, are mutually discussed under the term Alternative C. Effects specific to Option 1 or Option 2 are designated accordingly. The standard definitions for terms referring to impact duration that are used in the effects analysis are as follows, unless otherwise stated:

Short-Term Effect: The effect occurs only during or immediately after implementation of the alternative. For the purposes of this RMP, short-term effects would occur during the first five years.

Long-Term Effect: The effect could occur for an extended period after implementing the alternative. The effect could last several years or more and could be beneficial or adverse. For the purposes of this RMP, long-term effects would occur beyond the first five years and perhaps over the life of the RMP.

4.1.3 Cumulative Impacts

Cumulative effects are defined as the direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action (40 CFR Part 1508.7). Guidance for implementing NEPA (Public Law 91-190, 1970) requires that federal agencies identify the timeframe and geographic boundaries within which they will evaluate potential cumulative effects of an action and the specific past, present, and reasonably foreseeable projects that will be analyzed. Effects of past actions and

activities on resources are manifested in the current condition of the resource, which is described in Chapter 3 (Affected Environment) for resources on BLM-administered lands.

For this EIS, the cumulative impact assessment timeframe is from approximately 1982 to 2025, with some exceptions where additional past data are available. This encompasses a range within which data are generally available and forecasts can be reasonably made. This analysis is provided for each resource. It is general because decisions about other actions in the planning area would be made by many public and private entities, and the location, timing, and magnitude of these actions are not well known.

The geographic region of influence for analysis is shown on Figure 4-1. The Cumulative ROI was developed by using the major land resource areas identified in the Natural Resource Conservation Service USDA Handbook 296. Major land resource areas are geographically associated land resource units that are typically coextensive with state general soil map units that may be further subdivided based on significant geographic differences in soils, climate, water resources or land use (NRCS 2006).

Public documents and data prepared by federal, state, and local government agencies are the primary information sources for past, present, and reasonably foreseeable future actions and for identifying reasonable trends in resource conditions and land uses. Actions undertaken by private persons and entities are assumed to be captured in the information made available by such agencies. Actions included in the cumulative impact analysis do not affect all resources equally: some resources would be affected by several or all of the described activities, while others would be affected very little or not at all. The actions that make up the cumulative impact scenario were analyzed in conjunction with the impacts of each alternative to determine if they would have any additive or interactive effects on a particular resource.

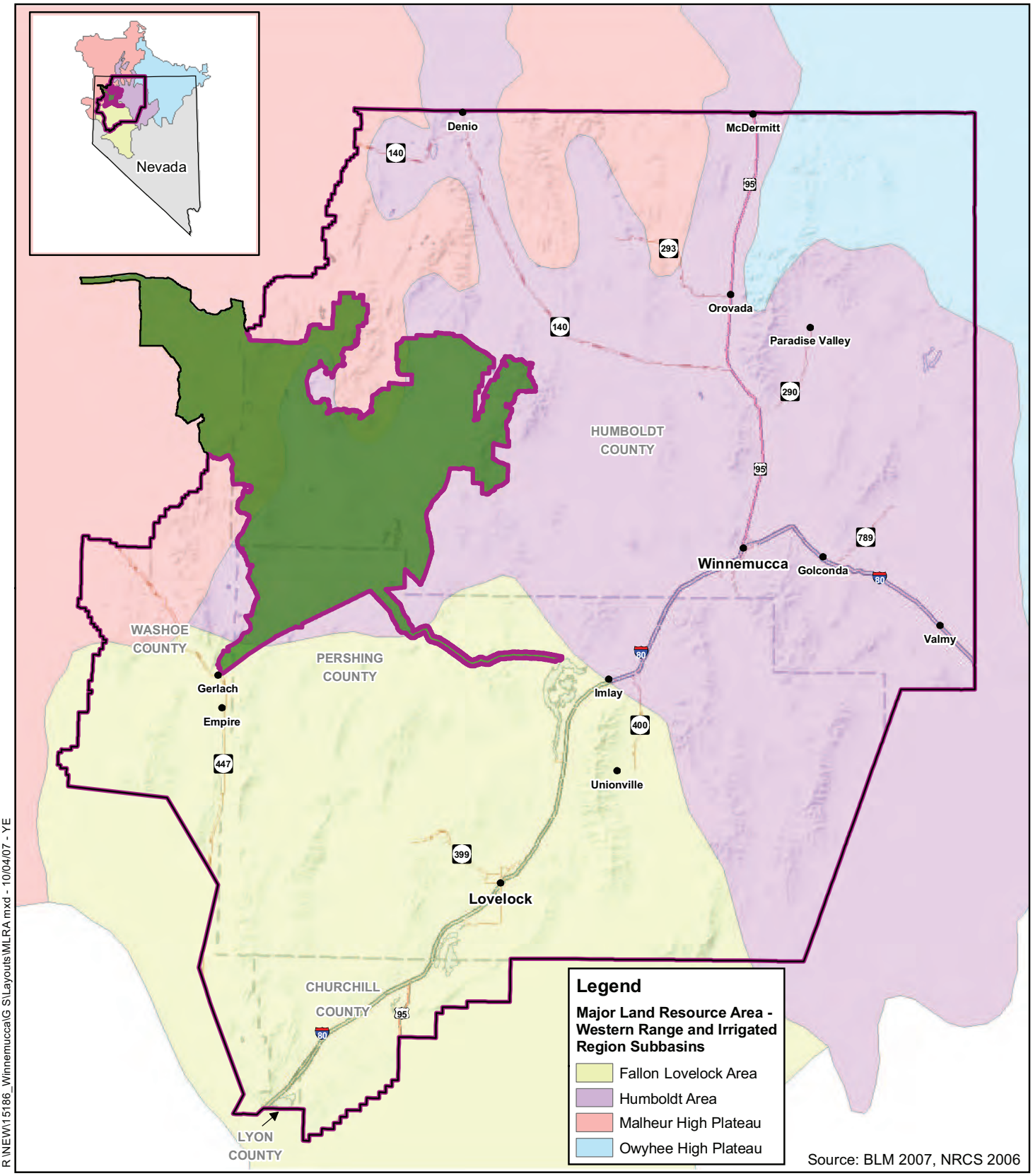
Actions and trends with the potential to cumulatively affect the resources evaluated (e.g., water resources, vegetation) are identified below.

Land tenure actions. Land tenure actions of various sizes are occurring and will continue to occur to consolidate BLM-administered lands and facilitate management.

Wildland fires. Wildland fires have occurred and will continue to occur over time; given the drought conditions, altered fire regime and increase in cheatgrass and other invasive weeds, the frequency of fires could be greater than historical averages and could burn larger areas. Fires will be managed as a resource tool and suppressed as appropriate.

Fish and Wildlife. Populations of some fish and wildlife species are declining in Nevada. Declining wildlife and fish species will likely receive increased federal and state agency restoration and conservation efforts (e.g., mule deer, antelope, and bighorn sheep). Other species, like elk, could migrate into parts of the WDO and become established on the landscape.

Listings under the Endangered Species Act. Some flora and fauna species have declined to the level where listing under the ESA became necessary. Lahontan cutthroat trout is a threatened fish species that inhabits 155 streams and six lakes in the Lahontan Basin. However, the current populations within the WDO exist in approximately 18 streams and one lake. Potential listings under



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No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

N
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Legend

- BLM Winnemucca Field Office Administrative Boundary
- BLM Winnemucca RMP Boundary
- Black Rock/High Rock NCA RMP Area
- County Boundaries
- Towns
- U.S. Highway
- U.S. Interstate
- State Highway

Winnemucca Field Office RMP Cumulative Impact Analysis - Region of Influence

Northwest Nevada

Figure 4-1

the ESA may occur in the foreseeable future if populations of sensitive species continue to decline; species that may have more potential for listing than other species may include federally listed candidate species and BLM sensitive species. There is habitat within the district office that may support the Columbia spotted frog, which is a candidate for listing under the ESA.

Livestock grazing. Domestic livestock (cattle, sheep, and horses) have grazed and will continue to graze most of the area, including BLM-administered lands, private lands, and state lands.

Mineral development has occurred continuously in the region for over 150 years. Mining has occurred and continues to occur on BLM-administered lands and on private lands, State of Nevada lands, and tribal lands. Mining is an important industry in many of the rural counties of Nevada and will likely continue into the reasonably foreseeable future. The reasonably foreseeable development of mineral resources on public lands in the WDO is presented in Appendix I.

Road construction has occurred in association with mining and energy development on BLM-administered lands, private lands, and State of Nevada lands.

Population. The population of Nevada increased by nearly 20.72 percent between 2000 and 2005. From 2000 to 2005, the population of all five counties in the planning area has grown an average of approximately 15.34 percent to 485,344 people. Humboldt County's population is expected to decline from 2005 to 2025 by 663 people (a decrease of 4.15 percent), as is Pershing County's population, which is projected to decline by 266 people (a decrease of 3.79 percent). The populations of all other counties in the planning area are expected to increase by a range of 29.41 percent to 95.39 percent by 2025. The population of Lyon County is projected to have the highest growth by 2025, growing by 43,231 people (an increase of 95.39 percent). By 2025, the population of Nevada is expected to increase by 1,867,133 people (an increase of 76.26 percent) (Nevada State Demographer's Office 2007).

Recreation has increased, and use patterns and motorized technology have changed. The following are expected trends:

- Recreation-related visits to Nevada are estimated to continue to increase at an annual rate of 1 to 4 percent (BLM 2005f).
- Recreational activities, specifically motorized recreational activities, will continue to increase in popularity and increase in use.
- An increase in the use of developed recreation sites and campgrounds is likely as the population increases.

Noxious weeds have invaded the area, carried by wind, humans, machinery, and animals (pets, livestock, and wildlife). Cooperative weed management activities exist among the counties, private landowners, and government agencies. Noxious weed invasion is increasing and will continue, potentially increasing treatment efforts. The ROD for Vegetation Treatment on BLM Lands in Seventeen Western State Decision was completed in 2007 and resulted in an increase of use of chemical treatments.

Access to BLM lands has been restricted by some private landowners and is likely to be increasingly restricted. The demand for access to public lands has increased and will continue to increase with growth in population and recreational use.

Archaeological investigations, illegal activities (e.g., cultural resource site vandalism or collecting), and development and maintenance activities (e.g. grazing, mining, recreation use, OHV use) that adversely affect sites have occurred and will likely continue to occur on public and private lands.

4.1.4 Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA requiring that a federal agency identify relevant information that may be incomplete or unavailable for an evaluation of reasonably foreseeable significant adverse effects in an EIS (40 CFR 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included or addressed in an EIS. Knowledge and information is and will always be incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the RMP. Considerable effort has been taken to acquire and convert resource data into digital format for use in the plan—both from BLM sources and from outside sources.

Certain site-specific information was unavailable for use in developing this plan, usually because inventories have either not been conducted or are not complete. Some of the major types of data that are incomplete include cultural resources (most of the WDO has not been inventoried for cultural resources), paleontological resources, vegetation, wildlife, riparian inventories, and noxious weeds. The BLM has information to support planning level decisions, although the data is incomplete for specific areas. Ongoing data collection and analysis provide a general understanding of the resources trends that were used in developing the alternatives and assessing impacts. The BLM will continue monitoring and taking inventory, as needed, and this information will be used to assess the effectiveness of management measures.

The resource management plan sets objectives for broad level management of the decision area, while implementation level planning requires subsequent site specific-analysis. During the implementation phase, additional surveys and data could be required to analyze site-specific decisions made in implementation level planning, such as in the ACEC management plans and the travel management plan.

This RMP is also based on the concept of adaptive management, so it is dynamic enough to account for changes in resource conditions (such as large-scale wildfire), new information and science, and changes in regulation and policies. The RMP may be amended to respond to these factors. No incomplete or unavailable information was deemed essential to a reasoned choice among the alternatives portrayed in this EIS.

4.2 RESOURCES

4.2.1 Air Quality

Summary

The major sources of air pollution emissions within the WDO area include wildland fires, agricultural burns, vehicle traffic on unpaved roads, OHV use of unpaved roads, OHV use itself, wind erosion from dry lakebeds and other poorly vegetated areas, mining and mineral developments, and energy resource developments. Wildland fires generally are the emission source with the greatest and most widespread impact on air quality in the WDO area. Depending on wind conditions, wildland fires and prescribed burns elsewhere can have an impact on air quality conditions in the WDO area. Other emission sources tend to have more localized effects on air quality.

Air quality management objectives for all of the RMP alternatives focus on compliance with federal and state air quality standards and air quality management programs. Owners and operators of mineral and energy resource development projects would continue to be subject to state and federal air quality management programs, including air permit programs and fugitive dust control programs. Both existing and future gold and silver mining operations would be subject to Nevada mercury emission regulations. The WDO area has been designated as being in compliance with federal ambient air quality standards, and it also is in compliance with Nevada air quality standards. The EPA exceptional events policy excludes air quality impacts associated with natural events from consideration when determining whether or not an area complies with federal ambient air quality standards. Existing programs, procedures, and the Basic Smoke Management Plan would continue to ensure that if prescribed burns do occur, they would not result in excessive smoke impacts on smoke-sensitive areas.

Alternatives A and C would not allow the use of wildfires for resource benefit, while Alternatives B and D would. Allowing wildfires to burn in situations where the fire provides resource benefits would result in some increase in emissions for Alternatives B and D compared to Alternatives A and C. However, wildfire use for resource benefit is likely to be only a minor contributor to total annual emissions from wildfires.

Table 4-1 summarizes general air quality considerations for each of the RMP alternatives. Future mining activities, oil and gas developments, geothermal developments, and renewable resource developments are expected to be similar under all RMP alternatives. RMP alternatives are expected to differ somewhat in the location and amount of recreational activity, especially OHV activity. Because the spread of cheatgrass has been a major factor affecting the location, frequency, and intensity of wildland fires, differences among RMP alternatives in the effectiveness of cheatgrass control are expected to produce differences in wildland fire emissions. Alternative C is distinguished in two aspects from the other alternatives in terms of air quality implications. On the one hand, Alternative C is expected to have the lowest level of OHV use among the alternatives since OHV use generally would be limited to established roads and trails. On the other hand, Alternative C may indirectly increase the recurrence interval for wildland fires since it is likely to have less effective programs for cheatgrass control than the other alternatives.

Table 4-1
Summary of Effects on Air Quality—Alternatives A, B, C, and D

Indicator	Alternative A	Alternative B	Alternative C *	Alternative D
Compliance with air quality standards	In compliance.	In compliance.	In compliance.	In compliance.
Air quality degradation from baseline conditions	Minimal degradation.	Minimal degradation.	Minimal degradation.	Minimal degradation.
Clean Air Act conformity review requirements	Not required.	Not required.	Not required.	Not required.
Wildland fires	Similar to recent patterns.	Possibly lower than current patterns, depending in part on success of cheatgrass control program.	Possibly higher than recent patterns if cheatgrass control is less effective than under other alternatives.	Possibly lower than current pattern, depending in part on success of cheatgrass control program.
PM_{10} emissions from wildfires	752 tons per year, based on 1997 to 2006 average.	Similar to Alternative A, perhaps slightly lower.	Similar to Alternative A, perhaps slightly higher.	Similar to Alternative A, perhaps slightly lower.
Prescribed burns and fire for resource benefit allowed.	Prescribed burns similar to recent patterns; no fire for resource benefit allowed.	Prescribed burns similar to recent patterns; some fire for resource benefit possible.	No prescribed burns; no fire for resource benefit allowed.	Prescribed burns similar to recent patterns; some fire for resource benefit possible.
OHV use	OHV use similar to current patterns; 6,782,790 acres open to OHV use; 416,652 acres limited OHV use; 24,832 acres closed to OHV use.	Overall effects on OHV use uncertain; 1,460,200 acres open to OHV use; 5,445,218 acres limited OHV use; 24,832 acres closed to OHV use.	OHV use generally limited to roads and trails; possible decrease in overall OHV use; 0 acres open to OHV use; 7,143,177 acres limited OHV use; 61,427 acres closed to OHV use.	Overall effects on OHV use uncertain; 289,932 acres open to OHV use; 6,878,592 acres limited OHV use; 35,483 acres closed to OHV use.
Mining activity	Closures of existing operations likely to be offset by new operations.	Closures of existing operations likely to be offset by new operations.	Closures of existing operations likely to be offset by new operations.	Closures of existing operations likely to be offset by new operations.

Indicator	Alternative A	Alternative B	Alternative C *	Alternative D
Oil and gas development	248 acres disturbed; 2 discoveries. One well with small scale production.	248 acres disturbed; 2 discoveries. One well with small scale production.	248 acres disturbed; 2 discoveries. One well with small scale production.	248 acres disturbed; 2 discoveries. One well with small scale production.
Geothermal development	605 acres disturbed; 5 power plants.	605 acres disturbed; 5 power plants.	605 acres disturbed; 5 power plants.	605 acres disturbed; 5 power plants.
Renewable energy development	Changes not identifiable.	Changes not identifiable.	Changes not identifiable.	Changes not identifiable.
Greenhouse gas emissions from livestock grazing	1,083,840 tons per year of methane emissions, 24,928,315 tons per year carbon dioxide equivalents.	1,083,840 tons per year of methane emissions, 24,928,315 tons per year carbon dioxide equivalents.	For Option 1, 1,083,840 tons per year of methane emissions, 24,928,315 tons per year carbon dioxide equivalents. For Option 2, no greenhouse gas emissions from livestock grazing in WDO area, but increased greenhouse gas emissions from livestock operations outside WDO area.	1,083,840 tons per year of methane emissions, 24,928,315 tons per year carbon dioxide equivalents.
Greenhouse gas emissions from wild horses and burros	39,111 tons per year of methane emissions, 899,555 tons per year carbon dioxide equivalents.	39,111 tons per year of methane emissions, 899,555 tons per year carbon dioxide equivalents.	39,111 tons per year of methane emissions, 899,555 tons per year carbon dioxide equivalents.	39,111 tons per year of methane emissions, 899,555 tons per year carbon dioxide equivalents.
Greenhouse gas emissions from wildfires	301,507 tons per year carbon dioxide equivalents, based on 1997 – 2006 average.	Similar to Alternative A, perhaps slightly lower.	Similar to Alternative A, perhaps slightly higher.	Similar to Alternative A, perhaps slightly lower.
Roadway construction and maintenance	Similar to current patterns.	Similar to current patterns.	Similar to current patterns.	Similar to current patterns.
Vehicle traffic on unpaved roads	Similar to current patterns.	Slight increase from current patterns.	Slight increase from current patterns.	Slight increase from current patterns.

*Options 1 and 2.

Methods of Analysis

Methods and Assumptions

Available information was insufficient to develop quantitative emission estimates for activities addressed by the RMP alternatives. Quantitative emissions estimates were developed for historical wildland fires to provide context for evaluating wildland fire management policies under the different alternatives. Wildland fire emissions were quantified using the First Order Fire Effects emissions model, or FOFEM. Additionally, potential ambient smoke concentrations were analyzed using the Simple Approach Smoke Estimation Model, or SASEM4. Quantitative estimates of greenhouse gas emissions were made using generalized livestock methane generation factors developed by the Intergovernmental Panel on Climate Change (2006). Qualitative evaluations of air quality issues are presented for management topics when quantitative analyses were not feasible.

Effects from Air Quality Management

Effects Common to All Alternatives

There are no effects common to all alternatives from air quality management.

Individual Effects under Alternatives A, B, and D

RMP air quality management objectives and actions under all alternatives focus on compliance with state and federal requirements and programs. The most important regulatory programs are those related to prescribed burns or allowing fire for resource benefit and those related to control of fugitive dust from surface area disturbance. Wildland fires release both criteria air pollutants and greenhouse gas emissions. Surface area disturbance is a source of fugitive dust. State and federal regulatory programs related to these emission sources are designed to minimize the resulting air pollutant concentrations downwind of the emission sources. Alternatives A, B, and D include policies and actions that allow the use of prescribed burns. The BLM would continue to comply with Nevada permit program requirements for prescribed burns. Any prescribed burn expected to emit more than one ton of PM_{10} would require an open burn permit from the Nevada Bureau of Air Pollution Control. Prescribed burns expected to emit more than 10 tons of PM_{10} would require a more detailed permit application than those expected to emit less than 10 tons of PM_{10}. In addition, a burn plan is required for prescribed burns expected to emit more than 10 tons of PM_{10}. There are no air permit requirements for wildland fire suppression activities. Programs allowing fire for resource benefit require an annual permit application that identifies areas being considered for prescribed fires or for allowing fire for resource benefit. The permit application must identify the conditions under which naturally ignited wildfires may be allowed to burn rather than being suppressed. BLM road construction and road maintenance activities that would disturb more than 20 acres would be subject to Nevada surface area disturbance permit requirements and would require preparation of a fugitive dust control plan. Air quality effects would be similar under Alternatives A, B, and D. The extent to which air quality effects would be greater than those under Alternative C would depend on the extent of prescribed burn activities. The WDO has conducted only limited prescribed burns in the past.

Individual Effects under Alternative C

RMP air quality management objectives and actions under Alternative C focus on compliance with state and federal requirements and programs. Alternative C differs from the other alternatives in that it does not include a prescribed burn program or a program to allow fire for resource benefit. Thus, Alternative C would not involve compliance with Nevada permit requirements for prescribed burns. There are no air permit requirements for wildland fire suppression activities. Construction and maintenance of unpaved roadways can be a source of fugitive dust. BLM road construction and road maintenance activities that would disturb more than 20 acres would be subject to Nevada surface area disturbance permit requirements and would require preparation of a fugitive dust control plan. Air quality effects from air quality management programs under Alternative C are slightly less than those under the other alternatives, with the magnitude of the difference depending on the extent to which other alternatives implement prescribed burn activities. The WDO has conducted only limited prescribed burns in the past.

Effects from Geology Management

Effects Common to All Alternatives

There are no effects common to all alternatives from geologic resource management.

Individual Effects under Alternative A

Under Alternative A, exclusion zones would remain open to OHV use. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative A might produce slightly more OHV fugitive dust and engine emissions than the other alternatives. In addition, Alternative A is expected to have higher levels of OHV use than under the other alternatives.

Individual Effects under Alternative B

Under Alternative B, OHV use within exclusion zones would be limited to existing roads. In addition, OHV management policies under Alternative B are expected to result in slightly higher OHV use than under Alternative D but less OHV use than under Alternative A. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative B might produce slightly less OHV fugitive dust and engine emissions than under Alternative A and slightly more OHV fugitive dust and engine emissions than under Alternatives C and D.

Individual Effects under Alternative C

Under Alternative C, roads within exclusion zones would be closed to OHV use. In addition, Alternative C would have the most restrictive policies and actions concerning OHV use and consequently are likely to have lower OHV use levels than under the other alternatives. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Thus, Alternative C might produce slightly less OHV fugitive dust and engine emissions than the other alternatives.

Individual Effects under Alternative D

Under Alternative D, OHV use within exclusion zones would be limited to existing roads. In addition, OHV management policies under Alternative D are expected to result in slightly lower OHV use levels than under Alternatives A and B but higher use levels than under Alternative C OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative D might produce slightly less OHV fugitive dust and engine emissions than under Alternatives A and B and slightly more OHV fugitive dust and engine emissions than under Alternative C.

Effects from Soil Resources Management

Effects Common to All Alternatives

Exposed soils in disturbed or poorly vegetated areas are a potential source of fugitive dust from wind erosion, which can cause elevated concentrations of suspended particulate matter in downwind locations. Vegetation cover greatly reduces the amount of fugitive dust generated by wind erosion, and even sparse vegetation cover can significantly reduce fugitive dust generation when wind speeds are not extreme. All alternatives include generalized policies and actions to reduce soil erosion and apply BMPs. Vegetation management actions would be the primary mechanism for implementing measures that reduce wind erosion. All alternatives would continue to implement on-going emergency stabilization, burned area rehabilitation, and mine reclamation programs that help reduce soil erosion from wind and water. Other effects from soil resources management are discussed separately for each alternative.

Alternatives A and D are similar and have the greatest potential to reduce wind erosion through vegetation management; Alternative C would be more effective than Alternative B at reducing wind erosion.

Individual Effects under Alternative A

Vegetation management measures would be the primary wind erosion controls implemented under Alternative A.

Individual Effects under Alternative B

Alternative B would implement various measures to reduce soil erosion but would not apply soil amendments.

Individual Effects under Alternative C

Alternative C would implement various measures to reduce soil erosion, including the use of soil amendments and seasonal closures to avoid compaction of moist soils. Because it would eliminate livestock grazing, Alternative C, Option 2 would have the least amount of wind erosion from unburned areas.

Individual Effects under Alternative D

Alternative D would implement various measures to reduce soil erosion, including the use of soil amendments and seasonal closures to avoid compaction of moist soils.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Water resources policies and actions under Alternative A would have only negligible air quality impacts from actions, such as well construction and livestock or wildlife watering facilities. Alternative A has no express policy with respect to water import or export projects. The air quality implications of water resource management policies are so indirect that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative B

Water resources policies and actions under Alternative B would have only negligible air quality impacts from actions, such as well construction and livestock or wildlife watering facilities. Any water import or export projects approved under Alternative B might result in limited air quality impacts from construction activities. The air quality implications of water resource management policies are so indirect that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative C

Water resources policies and actions under Alternative C would have only negligible air quality impacts from actions, such as well construction and livestock or wildlife watering facilities. Any water import or export projects approved under Alternative C might result in limited air quality impacts from construction activities. The air quality implications of water resource management policies are so indirect that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative D

Water resources policies and actions under Alternative D would have only negligible air quality impacts from actions, such as well construction and livestock or wildlife watering facilities. Any water import or export projects approved under Alternative D might result in limited air quality impacts from construction activities. The air quality implications of water resource management policies are so indirect that it is not possible to distinguish among alternatives in this regard.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

Wildland fires release both criteria air pollutants and greenhouse gas emissions. Vegetation treatments to improve stand health would reduce the buildup of fuels and ultimately would reduce emissions should treated areas burn. Other effects from forest and woodland products management are discussed separately for each alternative.

Individual Effects under Alternative A

Alternative A would encourage prompt fire suppression efforts in broadleaf woodland habitats. Prescribed fires would be used to enhance deteriorated aspen and cottonwood stands. WDO has

conducted only limited prescribed burns in the past. The air quality implications of forest and woodland products management policies are so uncertain that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative B

Policies under Alternative B would allow the use of wildland fires in broadleaf woodland habitats to achieve stand health and structure objectives. Consequently, some wildfires may not be suppressed or controlled as quickly under Alternative B as they would be under Alternatives A or D, resulting in slightly higher wildfire emissions under Alternative B than under Alternatives A or D. The air quality implications of forest and woodland products management policies are so uncertain that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative C

There would be less fire suppression under Alternative C than under other alternatives. Alternative C also would not implement prescribed burns for resource management purposes but would allow fire for resource benefit. Consequently, some wildfires may not be suppressed or controlled as quickly under Alternative C as they would be under Alternatives A or D, resulting in slightly higher wildfire emissions under Alternative C than under Alternatives A or D. The air quality implications of forest and woodland products management policies are so uncertain that it is not possible to distinguish among alternatives in this regard.

Individual Effects under Alternative D

Policies under Alternative D would use prescribed fires to enhance deteriorated aspen stands. WDO has conducted only limited prescribed burns in the past. The air quality implications of forest and woodland products management policies are so uncertain that it is not possible to distinguish among alternatives in this regard.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

There are no effects common to all alternatives from weeds management.

Individual Effects under Alternative A

The use of prescribed fires and herbicides to control noxious and invasive weeds would produce small quantities of air pollutant emissions. Wildland fires release both criteria air pollutants and greenhouse gas emissions. Herbicides often include volatile organic compounds that are a precursor of ozone. The WDO has conducted only limited prescribed burns in the past. Emissions associated with weed management under Alternative A would be similar to emissions under Alternatives B and D and slightly more than emissions under Alternative C.

Individual Effects under Alternative B

The use of prescribed fires and herbicides to control noxious and invasive weeds would produce small quantities of air pollutant emissions. Wildland fires release both criteria air pollutants and greenhouse gas emissions. Herbicides often include volatile organic compounds that are a precursor

of ozone. The WDO has conducted only limited prescribed burns in the past. Emissions associated with weed management under Alternative B would be similar to emissions under Alternatives A and D and slightly more than emissions under Alternative C.

Individual Effects under Alternative C

In contrast to the other alternatives, Alternative C would not use prescribed fire or chemical treatments to control noxious and invasive weeds. Thus, Alternative C would have slightly lower direct air pollutant emissions from weed management activities than the other alternatives. Indirectly, Alternative C might lead to somewhat higher emissions from wildland fires due to less effective control of cheatgrass.

Individual Effects under Alternative D

The use of prescribed fires and herbicides to control noxious and invasive weeds would produce small quantities of air pollutant emissions. Wildland fires release both criteria air pollutants and greenhouse gas emissions. Herbicides often include volatile organic compounds that are a precursor of ozone. The WDO has conducted only limited prescribed burns in the past. Emissions associated with weed management under Alternative D would be similar to emissions under Alternatives A and B and slightly more than emissions under Alternative C.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no effects common to all alternatives from chemical and biological control management.

Individual Effects under Alternative A

The use of herbicides and pesticides under Alternative A would produce small quantities of volatile organic compound emissions. Air quality implications would be minor because large quantities of herbicides and pesticides are not expected to be used. Emissions associated with chemical controls under Alternative A would be similar to emissions under Alternatives B and D and more than under Alternative C, which does not call for chemical controls.

Individual Effects under Alternative B

The use of herbicides and pesticides under Alternative B would produce small quantities of volatile organic compound emissions. Air quality implications would be minor because large quantities of herbicides and pesticides are not expected to be used. Emissions associated with chemical controls under Alternative B would be similar to emissions under Alternatives A and D and more than under Alternative C, which does not call for chemical controls.

Individual Effects under Alternative C

In contrast to other alternatives, Alternative C would not use herbicides and pesticides and thus would have lower air pollutant emissions from biological and chemical control programs than under the other alternatives.

Individual Effects under Alternative D

The use of herbicides and pesticides under Alternative D would produce small quantities of volatile organic compound emissions. Air quality implications would be minor because large quantities of herbicides and pesticides are not expected to be used. Emissions associated with chemical controls under Alternative D would be similar to emissions under Alternatives A and B and more than under Alternative C, which do not call for chemical controls.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

There are no effects common to all alternatives from rangeland management.

Individual Effects under Alternative A

Alternative A does not include specific actions to control cheatgrass, but it does allow actions to maintain and improve vegetation conditions.

Individual Effects under Alternative B

Wildland fires release both criteria air pollutants and greenhouse gas emissions. Alternative B includes the use of prescribed fire for control of cheatgrass in mixed perennial or cheatgrass communities. Consequently, there may be slightly higher direct emissions from cheatgrass control programs under Alternative B than Alternatives A and C.

Individual Effects under Alternative C

Alternative C would employ various methods to control cheatgrass but would not employ prescribed burning or chemical treatments. Alternative C, Option 2 would prohibit the use of prescriptive grazing for control of cheatgrass. Consequently, Alternative C, Option 2 may have slightly lower direct emissions from cheatgrass control programs than Alternatives A and B and about the same emissions as under Alternative D. If cheatgrass control proves less effective under Alternative C than under other alternatives, then there would be an indirect effect on overall wildland fire emissions due to higher wildland fire recurrence intervals.

Individual Effects under Alternative D

Alternative D would employ various methods to control cheatgrass including prescribed burning. Wildland fires release both criteria air pollutants and greenhouse gas emissions. Consequently, Alternative D may have direct emissions from cheatgrass control programs similar to those from Alternatives A and B, and somewhat higher than those from Alternative C.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Riparian and wetlands management policies have no identifiable air quality implications under any of the alternatives.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Fish and wildlife management policies have no identifiable air quality implications under any of the alternatives.

Effects from Special Status Species Management

Effects Common to All Alternatives

Special status species management policies have no identifiable air quality implications under any of the alternatives.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Wild horse and burro management policies have few identifiable air quality implications under any of the alternatives. Wild horses and burros are a minor source of direct soil disturbance, which can lead to localized wind erosion. In addition, wild horses and burros are a source of greenhouse gas emissions from digestive fermentation and manure decomposition. Table 4-2 is a summary of estimated annual greenhouse gas emissions from wild horses and burros in the WDO area. The emission estimates presented in Table 4-2 are based on estimated wild horse and burro population numbers and annual methane emission rates published by the Intergovernmental Panel on Climate Change (IPCC 2006). Annual methane emissions from wild horses and burros are less than four percent of the annual methane emissions from livestock grazing in the WDO area.

Table 4-2
Estimated Annual Greenhouse Gas Emissions from Wild Horses and Burros in the WDO Area

Animal	Annual Average Population	Annual Methane Emissions, Tons per Year Digestive Fermentation	Annual Methane Emissions, Tons per Year Manure	Annual Methane Emissions, Tons per Year Total	GWP as CO_2e, tons per year
Wild horses	3,042	33,197	4,316	37,513	862,790
Wild burros	291	1,415	184	1,599	36,766
Total	3,333	34,612	4,500	39,111	899,555

Source: Tetra Tech
CO_2e = carbon dioxide equivalents
GWP = global warming potential as carbon dioxide equivalents (CO_2e)

Effects from Wildland Fire Management

Effects Common to All Alternatives

It is not feasible to make quantitative predictions about the future extent of wildland fires in the WDO area under the different alternatives because wildfire ignition is typically caused by

unpredictable sources, such as lightning or human activities. However, historical trends show that the annual acreage burned by wildland fires in the WDO area has increased significantly in the past ten years, compared to the previous ten years. For example, while the number of individual wildland fires increased by 9.4 percent between 1987 and 1996 and between 1997 and 2006, the acreage burned increased by 171 percent. Because wildfires are not planned, they are not subject to federal or state regulatory or permit programs. Prescribed fires are subject to federal agency management procedures and to state and local regulatory programs. The vast majority of wildland fires in the WDO area are wildfires, rather than prescribed burns. The wildfire emissions and smoke impact tables below provide a description of the impacts of wildland fires, even though wildfires are not subject to federal or state regulatory programs.

The FOFEM 5.5 model was used to estimate annual emissions of criteria pollutants and greenhouse gases from historical wildland fires in the WDO area. The criteria pollutants addressed in the FOFEM model include suspended particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide, nitrogen oxides, sulfur oxides, and total organic gases (labeled as methane in the model output). The greenhouse gas emissions addressed in the FOFEM model include carbon dioxide and methane. Emission estimates from the FOFEM model were supplemented by spreadsheet calculations of nitrous oxide greenhouse gas emissions based on EPA data (1996). FOFEM results for total organic gases were partitioned into reactive organic compounds and methane using data from EPA (1996) and Ottmar et. al (2000). Table 4-3 is a summary of annual emissions from past wildland fires in the WDO area. These emissions estimates provide an indication of the magnitude of annual wildland fire emissions that can reasonably be expected in the future. The historical data also indicate that most wildland fires in any year burn only a few acres. Most of the acreage burned annually by wildland fires occurs during a small number of large wildland fires, which typically are started by natural causes. Table 4-3 shows that the annual acreage burned by wildfires in the WDO area varies dramatically. Table 4-3 also shows that there has been a historical trend toward increased acreages being burned by wildfires. As indicated at the bottom of Table 4-3, the annual average number of acres burned in the WDO area increased by 171 percent from 1987 to 1996 and from 1997 to 2006, with a resulting increase in annual air pollutant and greenhouse gas emissions.

While various management programs and policies under the different alternatives may have an effect on the size and frequency of future wildland fires, it is unlikely that any alternative will substantially alter the historic pattern of wildland fires in the near future.

The air quality impacts of wildland fires were further evaluated using SASEM4. This model estimates the distance range within which ambient air quality standards for suspended particulate matter (PM_{10} and $PM_{2.5}$) are likely to be exceeded. SASEM was run for five different sizes of generic wildland fires for each of the two most important vegetation categories identified in the wildland fire database (western annual grasslands and sagebrush with grass). Table 4-4 is a summary of the results of the SASEM analyses for fires in western annual grasslands; Table 4-5 is a summary of the results of the SASEM analyses for fires in sagebrush with grass.

The SASEM results show that the distance at which smoke impacts can exceed federal PM_{10} and $PM_{2.5}$ standards varies significantly with meteorological conditions and with the size of the area burning at one time. While there is no control over weather conditions during wildland fires, prescribed fires can be scheduled to coincide with weather conditions that minimize the extent of downwind smoke impacts.

Table 4-3
Historical Wildland Fire Emissions in the WDO Area

Year	Acres Burned	ANNUAL EMISSIONS, TONS PER YEAR PM_{10}	ANNUAL EMISSIONS, TONS PER YEAR $PM_{2.5}$	ANNUAL EMISSIONS, TONS PER YEAR CO	ANNUAL EMISSIONS, TONS PER YEAR NO_x	ANNUAL EMISSIONS, TONS PER YEAR SO_x	ANNUAL EMISSIONS, TONS PER YEAR ROG	ANNUAL EMISSIONS, TONS PER YEAR CO_2	ANNUAL EMISSIONS, TONS PER YEAR CH_4	ANNUAL EMISSIONS, TONS PER YEAR N_2O	ANNUAL EMISSIONS, TONS PER YEAR CO_{2e}
1987	32,896	210	177	1,071	140	41	39	80,396	35	11	84,329
1988	25,865	165	139	840	110	32	31	63,040	27	8	66,124
1989	12,165	78	65	395	52	15	15	29,649	13	4	31,100
1990	5,167	33	28	168	22	6	6	12,593	5	2	13,210
1991	7,720	49	41	251	33	10	9	18,816	8	2	19,736
1992	11,412	73	61	371	48	14	14	27,814	12	4	29,175
1993	2,676	17	14	87	11	3	3	6,522	3	1	6,841
1994	27,469	175	148	892	117	34	33	66,949	29	9	70,225
1995	38,609	246	207	1,254	164	48	46	94,101	41	12	98,704
1996	270,960	1,727	1,456	8,803	1,151	339	323	660,404	286	87	692,713
1997	21,915	140	118	712	93	27	26	53,413	23	7	56,026
1998	25,910	165	139	842	110	32	31	63,150	27	8	66,239
1999	599,492	3,820	3,221	19,476	2,547	749	715	1,461,127	634	192	1,532,610
2000	205,625	1,310	1,105	6,680	873	257	245	501,165	217	66	525,683
2001	172,511	1,099	927	5,604	733	216	206	420,457	182	55	441,027
2002	13,573	86	73	441	58	17	16	33,081	14	4	34,700
2003	1,462	9	8	47	6	2	2	3,563	2	0.5	3,738
2004	651	4	3	21	3	1	1	1,587	1	0.2	1,664

Year	Acres Burned	ANNUAL EMISSIONS, TONS PER YEAR PM_{10}	ANNUAL EMISSIONS, TONS PER YEAR $PM_{2.5}$	ANNUAL EMISSIONS, TONS PER YEAR CO	ANNUAL EMISSIONS, TONS PER YEAR NO_x	ANNUAL EMISSIONS, TONS PER YEAR SO_x	ANNUAL EMISSIONS, TONS PER YEAR ROG	ANNUAL EMISSIONS, TONS PER YEAR CO_2	ANNUAL EMISSIONS, TONS PER YEAR CH_4	ANNUAL EMISSIONS, TONS PER YEAR N_2O	ANNUAL EMISSIONS, TONS PER YEAR CO_{2e}
2005	7,586	48	41	246	32	9	9	18,489	8	2	19,394
2006	130,664	883	702	4,244	555	163	156	318,415	138	42	333,993
1987-1996 Average	**43,503**	**277**	**234**	**1,413**	**185**	**54**	**52**	**106,029**	**46**	**14**	**111,216**
1997-2006 Average	**117,937**	**752**	**634**	**3,831**	**501**	**147**	**141**	**287,445**	**125**	**38**	**301,507**
1987-2006 Average	**80,720**	**514**	**434**	**2,622**	**343**	**101**	**96**	**196,737**	**85**	**26**	**206,362**

Source: Tetra Tech
PM_{10} = inhalable particulate matter
$PM_{2.5}$ = fine particulate matter
CO = carbon monoxide
NO_x = nitrogen oxides (ozone precursor)
SO_x = sulfur oxides
ROG = reactive organic compounds (ozone precursors)
CO_2 = carbon dioxide (greenhouse gas); GWP multiplier = 1
CH_4 = methane (greenhouse gas); GWP multiplier = 23
N_2O = nitrous oxide (greenhouse gas), GWP multiplier = 296
CO_{2e} = carbon dioxide equivalents of all greenhouse gases (CO_2, CH_4, and N_2O), computed using the GWP multipliers for each compound.
GWP = global warming potential as CO_2 equivalents (CO_{2e}); GWP multipliers from Intergovernmental Panel on Climate Change (2001), third assessment report, 100-year time frame
Emission estimates based on per-acre emission rates calculated by FOFEM 5.5 for sagebrush with grass and for saltbush or greasewood (moderate shrub cover) vegetation types.
Based on the historical ratio of acreages burned for each vegetation type, emission rates were weighted 75% sagebrush with grass and 25% saltbush or greasewood.
The FOFEM model output labeled as CH_4 is actually total organic compounds (ROG plus CH_4), assumed to be 53% ROG and 47% CH_4 for the dominant vegetation types in the WDO area.
Nitrous oxide emissions estimated using emission rates from AP-42 Section 13.1 (EPA 1996).

Table 4-4
Smoke Impact from Fires in Western Annual Grass Vegetation

Size of Burn	Burn Duration	Stability Class	Wind Speed	Distance to Which Standards are Exceeded PM_{10}	Distance to Which Standards are Exceeded $PM_{2.5}$
10 acres	8 hours	A (very unstable)	1-3 mph	None	None
		B (moderately unstable)	1-5 mph	None	None
		C (slightly unstable)	2-10 mph	None	None
		D (neutral)	4-10 mph	None	None
		E (slightly stable)	1-2 mph	None	Out to 2.8 miles
		E (slightly stable)	3-5 mph	None	None
		F (moderately stable)	1-3 mph	None	Out to 6.21 miles
100 acres	24 hours	A (very unstable)	1-3 mph	None	None
		B (moderately unstable)	1-5 mph	None	None
		C (slightly unstable)	2-10 mph	None	None
		D (neutral)	4-10 mph	None	None
		E (slightly stable)	1-3 mph	None	Out to 5.34 miles
		E (slightly stable)	4-5 mph	None	None
		F (moderately stable)	1-3 mph	None	Out to 19.76 miles
500 acres	24 hours	A (very unstable)	1-3 mph	None	None
		B (moderately unstable)	1 mph	None	Out to 0.87 mile
		B (moderately unstable)	2-5 mph	None	None
		C (slightly unstable)	2 mph	None	Out to 0.81 mile
		C (slightly unstable)	3-10 mph	None	None
		D (neutral)	4-5 mph	None	Out to 0.93 mile
		D (neutral)	6-10 mph	None	None
		E (slightly stable)	1-5 mph	None	Out to 29.14 miles
		F (moderately stable)	1-3 mph	None	Out to 44.17 miles

Size of Burn	Burn Duration	Stability Class	Wind Speed	Distance to Which Standards are Exceeded PM_{10}	Distance to Which Standards are Exceeded $PM_{2.5}$
1,000 acres	24 hours	A (very unstable)	1-3 mph	None	None
		B (moderately unstable)	1-2 mph	None	Out to 1.18 miles
		B (moderately unstable)	3-5 mph	None	None
		C (slightly unstable)	2-3 mph	None	Out to 1.18 miles
		C (slightly unstable)	4-10 mph	None	None
		D (neutral)	4-7 mph	None	Out to 1.55 miles
		D (neutral)	8-10 mph	None	None
		E (slightly stable)	1-5 mph	None	Out to 60.27 miles
		F (moderately stable)	1-3 mph	None	Out to 62.19 miles
5,000 acres	24 hours	A (very unstable)	1 mph	None	Out to 0.62 mile
		A (very unstable)	2-3 mph	None	None
		B (moderately unstable)	1-4 mph	None	Out to 2.42 miles
		B (moderately unstable)	5 mph	None	None
		C (slightly unstable)	2-8 mph	None	Out to 2.86 miles
		C (slightly unstable)	9-10 mph	None	None
		D (neutral)	4-10 mph	None	Out to 5.53 miles
		E (slightly stable)	1-2 mph	Out to 19.22 miles	Out to 62.19 miles
		E (slightly stable)	3-5 mph	None	Out to 31.77 miles
		F (moderately stable)	1-2 mph	Out to 62.14 miles	Out to 62.14 miles
		F (moderately stable)	3 mph	None	Out to 62.15 miles

Table 4-5
Smoke Impact from Fires in Sagebrush with Grass Vegetation

Size of Burn	Burn Duration	Stability Class	Wind Speed	Distance to Which Standards are Exceeded PM_{10}	Distance to Which Standards are Exceeded $PM_{2.5}$
10 acres	8 hours	A (very unstable)	Under 3 mph	None	None
		B (moderately unstable)	1-3 mph	None	Out to 1.68 miles
		B (moderately unstable)	4-5 mph	None	None
		C (slightly unstable)	2-5 mph	None	Out to 1.80 miles
		C (slightly unstable)	6-10 mph	None	None
		D (neutral)	4-10 mph	None	Out to 2.73 miles
		E (slightly stable)	1-3 mph	Out to 6.21 miles	Out to 6.21 miles
		E (slightly stable)	4-5 mph	None	Out to 6.21 miles
		F (moderately stable)	1-3 mph	Out to 6.23 miles	Out to 10.89 miles
100 acres	24 hours	A (very unstable)	1 mph	None	Out to 0.68 miles
		A (very unstable)	2-3 mph	None	None
		B (moderately unstable)	1 mph	Out to 0.93 mile	Out to 2.98 miles
		B (moderately unstable)	2-5 mph	None	Out to 1.62 miles
		C (slightly unstable)	2 mph	Out to 0.87 mile	Out to 3.67 miles
		C (slightly unstable)	3-10 mph	None	Out to 2.36 miles
		D (neutral)	4-5 mph	Out to 0.99 mile	Out to 8.39 miles
		D (neutral)	6-10 mph	None	Out to 4.10 miles
		E (slightly stable)	1-5 mph	Out to 19.76 miles	Out to 19.76 miles
		F (moderately stable)	1-3 mph	Out to 19.71 miles	Out to 45.37 miles

Size of Burn	Burn Duration	Stability Class	Wind Speed	Distance to Which Standards are Exceeded PM_{10}	Distance to Which Standards are Exceeded $PM_{2.5}$
500 acres	24 hours	A (very unstable)	1-3 mph	None	Out to 0.99 mile
		B (moderately unstable)	1-3 mph	Out to 1.86 miles	Out to 6.21 miles
		B (moderately unstable)	4-5 mph	None	Out to 1.74 miles
		C (slightly unstable)	2-6 mph	Out to 2.05 miles	Out to 8.89 miles
		C (slightly unstable)	7-10 mph	None	Out to 2.24
		D (neutral)	4-10 mph	Out to 3.29 miles	Out to 34.98 miles
		E (slightly stable)	1-5 mph	Out to 44.18 miles	Out to 62.01 miles
		F (moderately stable)	1-3 mph	Out to 55.13 miles	Out to 62.18 miles
1,000 acres	24 hours	A (very unstable)	1 mph	Out to 0.62 mile	Out to 1.18 miles
		A (very unstable)	2-3 mph	None	Out to 0.87 mile
		B (moderately unstable)	1-4 mph	Out to 2.49 miles	Out to 8.45 miles
		B (moderately unstable)	5 mph	None	Out to 1.99 miles
		C (slightly unstable)	2-8 mph	Out to 2.92 miles	Out to 12.99 miles
		C (slightly unstable)	9-10 mph	None	Out to 2.49 miles
		D (neutral)	4-10 mph	Out to 5.90 miles	Out to 62.20 miles
		E (slightly stable)	1-5 mph	Out to 62.20 miles	Out to 62.20 miles
		F (moderately stable)	1-3 mph	Out to 62.15 miles	Out to 62.15 miles

Size of Burn	Burn Duration	Stability Class	Wind Speed	Distance to Which Standards are Exceeded PM_{10}	Distance to Which Standards are Exceeded $PM_{2.5}$
5,000 acres	24 hours	A (very unstable)	1-2 mph	Out to 0.87 mile	Out to 1.80 miles
		A (very unstable)	3 mph	None	Out to 1.06 miles
		B (moderately unstable)	1-5 mph	Out to 4.67 miles	Out to 17.35 miles
		C (slightly unstable)	2-10 mph	Out to 6.34 miles	Out to 31.31 miles
		D (neutral)	4-10 mph	Out to 20.34 miles	Out to 62.17 miles
		E (slightly stable)	1-5 mph	Out to 62.18 miles	Out to 62.18 miles
		F (moderately stable)	1-3 mph	Out to 62.18 miles	Out to 62.18 miles

Source: Tetra Tech analyses

Effects from wildland fire management are discussed separately for each alternative.

Individual Effects under Alternative A

Wildland fires produce large quantities of PM_{10} and carbon monoxide emissions and lower quantities of other air pollutant emissions. Smoke from wildland fires can cause visibility and traffic safety problems in addition to air quality problems. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. Fire suppression objectives and actions under Alternative A are similar to those under the other alternatives. Vehicles and aircraft used for fire suppression operations and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

Prescribed burns can produce large quantities of PM_{10} and carbon monoxide emissions and lower quantities of other air pollutant emissions, depending on the size of the fire. Smoke from prescribed burns can cause visibility and traffic safety problems in addition to air quality problems. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. These impacts are reduced by implementing prescribed fire burn plans that take into consideration mitigation measures to reduce air quality, visibility and traffic impacts.

Vehicles, equipment, and aircraft used for fuel treatments and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions. The WDO has conducted only limited prescribed burns in the past. If this pattern is continued under Alternative A, then prescribed burns would not be a frequent source of localized air pollutant emissions. In contrast to Alternatives B and D, Alternative A does not designate specific acreages for fire use programs.

Individual Effects under Alternative B

Wildland fires produce large quantities of PM_{10} and carbon monoxide emissions and lower quantities of other air pollutant emissions. Smoke from wildland fires can cause visibility and traffic safety problems, in addition to air quality problems. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. Fire suppression objectives and actions in Alternative B are similar to those in the other alternatives. However, Alternative B includes objectives and actions allowing fire for resource benefit; consequently, some wildfires may not be suppressed or controlled as quickly under Alternative B as they would be under Alternatives A or C. This would result in slightly higher wildfire emissions under Alternative B than under Alternatives A or C. Vehicles and aircraft used for fire suppression operations and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

Prescribe fire objectives and actions under Alternative B are similar to those under the other alternatives. However, Alternative B includes objectives and actions allowing fire for resource benefit; consequently, the appropriate management may include allowing some wildfires to burn for resource benefit. This would result in slightly higher wildfire emissions under Alternative B than under Alternatives A or C. Vehicles, equipment, and aircraft used for post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

The WDO has conducted only limited prescribed burns in the past. If this pattern is continued under Alternative B, then prescribed burns would not be a frequent source of localized air pollutant emissions. In contrast to Alternatives A and C, Alternative B designates specific acreages for fire use programs.

Individual Effects under Alternative C

Wildland fires produce large quantities of PM_{10} and carbon monoxide emissions and lower quantities of other air pollutant emissions. Smoke from wildland fires can cause visibility and traffic safety problems, in addition to air quality problems. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. Fire suppression objectives and actions under Alternative C are similar to those under the other alternatives. Vehicles and aircraft used for fire suppression operations and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

Impacts from prescribed fire are similar to those described under alternative A. In contrast to the other alternatives, Alternative C would not make use of prescribed burns or wildfire use programs. However, because the WDO has conducted only limited prescribed burns in the past, it is not clear whether this difference from other alternatives would result in a significant overall difference in prescribed fire emissions. In contrast to Alternatives B and D, Alternative C does not designate any areas for fire use programs. This would result in slightly lower wildfire emissions under Alternative C than under Alternatives B or D. Emissions from vehicles and equipment used for fuel treatments would generate higher amounts of fugitive dust because prescribed fire and herbicides treatments would not be allowed; Thus, there may be more mechanical treatments Also, there would be no associated smoke emissions from prescribed fire.

Individual Effects under Alternative D

Wildland fires produce large quantities of PM_{10} and carbon monoxide emissions and lower quantities of other air pollutant emissions. Smoke from wildland fires can cause visibility and traffic safety problems, in addition to air quality problems. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. Fire suppression objectives and actions under Alternative D are similar to those under the other alternatives. Vehicles and aircraft used for fire suppression operations and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

Prescribe fire objectives and actions under Alternative D are similar to those under the other alternatives. However, Alternative D includes objectives and actions allowing fire for resource benefit; consequently, the appropriate management may include allowing some wildfires to burn for resource benefit. This would result in slightly higher wildfire emissions under Alternative D than under Alternatives A or C. Vehicles, equipment, and aircraft used for post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions.

The WDO has conducted only limited prescribed burns in the past. If this pattern is continued under Alternative D, then prescribed burns would not be a frequent source of localized air pollutant emissions. In contrast to Alternatives A and C, Alternative D includes a program for wildfire use.

Effects from Cultural Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from cultural resources management.

Individual Effects under Alternative A

Under Alternative A, most of the planning area, including areas near cultural resources would remain open to OHV use. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative A might produce slightly more OHV fugitive dust and engine emissions than Alternatives C and D and about the same OHV fugitive dust and engine emissions as Alternative B.

Individual Effects under Alternative B

Under Alternative B, most of the planning area, including areas near cultural resources, would remain open to OHV use. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative B might produce slightly more OHV fugitive dust and engine emissions than under Alternatives C and D and about the same OHV fugitive dust and engine emissions as Alternative A.

Individual Effects under Alternative C

Under Alternative C, areas designated as culturally sensitive would have OHV use limited to existing roads. Some segments of National Historic Trails would be closed to OHV use. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative C might produce slightly fewer OHV fugitive dust and engine

emissions than under Alternatives A and B and about the same OHV fugitive dust and engine emissions as Alternative D.

Individual Effects under Alternative D

Under Alternative D, areas designated as culturally sensitive would have OHV use limited to existing roads. Some segments of National Historic Trails would be closed to OHV use. OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Consequently, Alternative D might produce slightly fewer OHV fugitive dust and engine emissions than under Alternatives A and B, and about the same OHV fugitive dust and engine emissions as Alternative C.

Effects from Tribal Consultation

Effects Common to All Alternatives

Tribal consultation policies have no identifiable air quality implications under any of the alternatives.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Paleontological resources management policies have no identifiable air quality implications under any of the alternatives.

Effects from Visual Resources Management

Effects Common to All Alternatives

Visual resources management policies have no identifiable air quality implications under any of the alternatives.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

Cave and karst resources management policies have no identifiable air quality implications under any of the alternatives.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Livestock is a source of greenhouse gas emissions from digestive fermentation and manure decomposition. Table 4-6 is a summary of estimated annual greenhouse gas emissions from livestock grazing in the WDO area. Livestock population estimates used for the analysis were derived from grazing allotment data, assuming one AUM was equivalent to either one cow, one horse, or five sheep. For grazing allotments that allow a mix of livestock types, the available AUMs were split evenly among allowable livestock types. The emission estimates presented in Table 4-6 are based on estimated livestock population numbers and annual methane emission rates published by the Intergovernmental Panel on Climate Change (IPCC 2006). Livestock grazing in the WDO area is

a source of greenhouse gas emissions. Other effects from livestock grazing management are discussed separately for each alternative.

Table 4-6
Estimated Annual Greenhouse Gas Emissions from Livestock Grazing in the WDO Area

Livestock Type	Annual Average Population	Annual Methane Emissions, Tons per Year Digestive Fermentation	Annual Methane Emissions, Tons per Year Manure	Annual Methane Emissions, Tons per Year Total	GWP as CO_2e, tons per year
Cattle	24,676	1,033,603	27,200	1,060,803	24,398,474
Horses	1,359	14,831	1,928	16,759	385,447
Sheep	10,582	6,066	212	6,278	144,393
Total	36,617	1,054,499	29,340	1,083,840	24,928,315

Source: Tetra Tech
CO_2e = carbon dioxide equivalents
GWP = global warming potential as carbon dioxide equivalents (CO_2e).

Individual Effects under Alternative A

Livestock grazing can be a minor source of fugitive dust emissions by direct soil disturbance and reduced vegetation density and resulting in minor increases in wind erosion. When vehicles are used for transporting livestock to and from grazing allotments, the resulting vehicle traffic is a minor source of fugitive dust and vehicle engine emissions. Alternative A would have the same overall AUM designation as the other alternatives but would designate slightly more acres as open to grazing than would be the case under Alternative C Option 1 and Alternative D. Overall emissions associated with livestock grazing under Alternative A would be similar to those under Alternatives B, C Option 1, and D.

Individual Effects under Alternative B

Livestock grazing can be a minor source of fugitive dust emissions by direct soil disturbance and reduced vegetation density and resulting minor increases in wind erosion. When vehicles are used for transporting livestock to and from grazing allotments, the resulting vehicle traffic is a minor source of fugitive dust and vehicle engine emissions. Alternative B would have the same overall AUM designation as the other alternatives but would designate slightly more acres as open to grazing than would be the case under Alternative C Option 1 and Alternative D. Overall emissions associated with livestock grazing under Alternative B would be similar to those under Alternatives A, C Option 1, and D and would be higher than those under Alternative C Option 2.

Individual Effects under Alternative C

Option 1

Livestock grazing can be a minor source of fugitive dust emissions by direct soil disturbance and reduced vegetation density and the resulting minor increases in wind erosion. When vehicles are used for transporting livestock to and from grazing allotments, the resulting vehicle traffic is a minor source of fugitive dust and vehicle engine emissions. Alternative C, Option 1 would have the same overall AUM designation as under the other alternatives but would designate slightly fewer acres as open to grazing than would be the case under Alternatives A or B. Overall emissions associated with livestock grazing under Alternative C, Option 1 would be similar to those under Alternatives A, B, and D and would be higher than those under Alternative C, Option 2.

Option 2

Alternative C, Option 2 would eliminate livestock grazing within the WDO area. Consequently, Alternative C, Option 2 would have no emissions in the WDO area associated with livestock grazing. However, eliminating grazing from the WDO area would almost certainly lead to increased livestock grazing or livestock feed operations outside the WDO area. Increased livestock production outside the WDO area would result in increased greenhouse gas emissions outside the WDO boundaries. There is insufficient information to determine whether or not Alternative C, Option 2 would result in any net change in regional greenhouse gas emissions from livestock operations.

Individual Effects under Alternative D

Livestock grazing can be a minor source of fugitive dust emissions by direct soil disturbance, reduced vegetation density, and resulting minor increases in wind erosion. When vehicles are used for transporting livestock to and from grazing allotments, the resulting vehicle traffic is a minor source of fugitive dust and vehicle engine emissions. Alternative D would have the same overall AUM designation as the other alternatives but would designate slightly fewer acres as open to grazing than would be the case under Alternatives A, B, or C, Option 1. Overall emissions associated with livestock grazing under Alternative D would be similar to those under Alternatives A, B, and C, Option 1, and higher than those under Alternative C, Option 2.

Effects from Minerals Management

Effects Common to All Alternatives

General

Construction activities associated with mineral development projects would generate fugitive dust emissions from earthmoving and ground disturbance associated with facility, road, and right-of-way construction. Construction equipment operations also would be a source of engine exhaust emissions, which include both criteria pollutants and greenhouse gases. Owners or operators of mineral development projects would need to comply with state and federal air quality management requirements, including obtaining air quality permits and implementing fugitive dust control plans. Most mining operations and energy developments would be subject to stationary source permit requirements. Nevada dust control program regulations would apply to mineral or energy developments that disturb more than 20 acres. In addition, Nevada regulations on mercury

emissions (Regulation R189-05), which became effective in May 2006, apply to owners and operators of both existing and new gold or silver mining facilities, according to schedules established in the Nevada regulations.

Salable

Salable minerals include aggregate, sand, gravel, clay, pumice, decorative stone and similar minerals. Fugitive dust from extraction, processing, and material transport operations is the primary air quality issue of concern. Equipment used for extraction, processing, and material transporting is also a source of engine exhaust emissions, which include both criteria pollutants and greenhouse gases. Owners and operators of extraction and processing facilities for these minerals would need to comply with state and federal air quality management requirements, including obtaining air quality permits and implementing fugitive dust control plans.

Fluid

Fluid mineral resources include oil, natural gas, and geothermal resources. Oil and gas development would include construction of access roads and drilling pads, exploratory drilling operations, production drilling operations, transport pipeline construction, and initial fluid processing. Fugitive dust and equipment engine exhaust emissions would be generated during construction and drilling phases. Equipment engine emissions, which include both criteria pollutants and greenhouse gases, and volatile organic compound emissions would occur during production drilling and initial fluid processing. Oil and gas development can also lead to fugitive emissions of methane, a greenhouse gas. There are no producing oil or gas wells in the WDO area, and only a small amount of additional oil and gas development activity is anticipated. The reasonably foreseeable development (RFD) scenario, discussed below, anticipates a total of 12 wildcat exploratory wells over the next 15 to 20 years, resulting in only two discoveries in the WDO area. However, the distance to gas transmission lines is expected to prevent significant commercial production during the next 15 to 20 years. Only one small-scale production well is anticipated in the WDO area during the next 20 years. Development of producing facilities would typically require stationary source air permits from the Nevada Bureau of Air Pollution Control.

Geothermal development could include both power plant development and facilities for the direct use of geothermal fluids as a heat source. Both geothermal power plants and direct use facilities (for example, vegetable dehydrators) currently exist in the WDO area. The RFD, discussed below, anticipates 40 new geothermal leases with 120 exploratory holes and the development of five new geothermal power plants in the WDO area over the next 20 years. Geothermal development would typically include construction of access roads and drilling pads, exploratory drilling operations, production drilling operations, pipeline construction, power plant or direct use facility construction, and electrical transmission line construction for power plants. Depending on the type of power plant or direct use facility constructed, there would be requirements for cooling towers, cooling ponds, or reinjection wells. Fugitive dust and equipment engine exhaust emissions, which include both criteria pollutants and greenhouse gases, would be generated during construction and drilling phases. Emissions associated with production well and power plant or direct use facility operations would depend on the type of heat transfer system that is used. Binary heat transfer systems are closed loop systems, with no significant air pollutant emissions. Flash steam systems release steam and minerals contained in geothermal fluids as a result of flashing to steam for heat transfer and cooling of

geothermal fluids in cooling towers or cooling ponds. Hydrogen sulfide and particulate matter from minerals contained in geothermal fluids would be the most important air pollutants from flash steam power plants. Particulate matter released as dissolved or suspended mineral in the steam and cooling tower drift can include a wide range of heavy metals and other substances. Facilities using cooling towers would have a greater air quality impact than those using cooling ponds. Emissions from geothermal facilities would be regulated by stationary source air permits from the Nevada Bureau of Air Pollution Control.

Solid

Leasable energy minerals include coal and oil shale. There are no known economically viable coal deposits in the WDO area. Leasable nonenergy minerals can include sodium, phosphate, potash, potassium, or sulfur deposits. Fugitive dust from extraction, processing, and material transport operations would be the primary air quality issue of concern. Equipment used for extraction, processing, and material transport would also be a source of engine exhaust emissions, which include both criteria pollutants and greenhouse gases. Owners and operators of extraction and processing facilities for these minerals would need to comply with state and federal air quality management requirements, including obtaining air quality permits and implementing fugitive dust control plans.

Locatable

Locatable minerals include metallic minerals, precious and semiprecious gemstones, and industrial minerals. Gold and silver are the dominant metallic minerals mined in the WDO area. All existing metallic mineral mining operations in the WDO area employ open pit operations with chemical leaching for mineral recovery. Dolomite, diatomite, and gypsum are important industrial minerals mined there. Fugitive dust from extraction, processing, and material transport operations are the primary air quality issue of concern. Equipment used for extraction, processing, and material transport are also a source of engine exhaust emissions, which include both criteria pollutants and greenhouse gases. Chemical and thermal processes used for ore processing can be an additional source of air pollutant emissions. Owners and operators of extraction and processing facilities for these minerals would need to comply with state and federal air quality management requirements, including obtaining air quality permits and implementing fugitive dust control plans. Nevada regulations on mercury emissions (Regulation R189-05) apply to owners and operators of both existing and new gold or silver mining facilities, according to schedules established in the Nevada regulations.

RFDs

Reasonably foreseeable development scenarios for the next 15 to 20 years have been identified for oil and gas development and for geothermal resource development. The scenario for oil and gas resources assumes the drilling of 12 wildcat wells, with two of these resulting in discoveries. Each of the two discoveries would have two subsequent step-out wells to define the limits of the discovery. Ground disturbance associated with this scenario includes 45.5 acres disturbed for well sites and 202 acres disturbed for road and pipeline construction. However, the distance to gas transmission lines is expected to prevent significant commercial production during the next 15 to 20 years. Only one small-scale production well is anticipated in the WDO area during the next 20 years.

The scenario for geothermal development assumes 40 leases, with 120 exploratory holes drilled over the next 20 years. Five geothermal power plants would be developed in five-megawatt stages, typically reaching a total capacity of 15 to 30 megawatts. Each 5 megawatts of power plant capacity typically requires one production well. Ground disturbance associated with this scenario would total 605 acres (150 acres for power plants, 150 acres for wells, 25 acres for cooling ponds, 75 acres for pipelines, 105 acres for access roads, 50 acres for mainline roads, and 50 acres for transmission lines). The reasonably foreseeable development scenario for geothermal facilities represents a typical facility size, not a maximum facility size.

Individual Effects under Alternative A

Effects under Alternative A are the same as those discussed under Effects Common to All Alternatives.

Individual Effects under Alternative B

Effects under Alternative B are the same as those discussed under Effects Common to All Alternatives.

Individual Effects under Alternative C

Effects under Alternative C are the same as those discussed under Effects Common to All Alternatives.

Individual Effects under Alternative D

Effects under Alternative D are the same as those discussed under Effects Common to All Alternatives.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Effects from recreation, visitor outreach, and services management are discussed separately for each alternative.

Individual Effects under Alternative A

On-road and off-road vehicle use is the major source of air pollutant emissions associated with visitor activities. In addition to on-road vehicle travel, approximately 60 percent of visitors engage in some type of OHV use. Campfires, camp stoves, and small portable generators are additional sources of emissions associated with recreational visitor activities. Vehicle engines, campfires, camp stoves, and portable generators are sources of both criteria pollutant and greenhouse gas emissions. Under Alternative A, most of the WDO area (6,782,790 acres) would be open to OHV use. An additional 416,652 acres would have OHV use restricted to existing roads. Under Alternative A, 24,832 acres would be closed to OHV use. Alternative A would not designate any new special recreation management areas. Alternative A would have fewer visitor outreach and educational programs than the other alternatives. Although no visitor use projections are available, it is possible that Alternative A would have slightly lower visitor use than the other alternatives. Alternative A, however, has more area open to OHV use and fewer acres limited to OHV use on existing roads

than the other alternatives. Consequently, Alternative A may have higher OHV use levels than the other alternatives. Because OHV activity emissions are likely to dominate overall recreation-related emissions, Alternative A may have higher recreation-related emissions than the other alternatives.

Individual Effects under Alternative B

On-road and off-road vehicle use is the major source of air pollutant emissions associated with visitor activities. In addition to on-road vehicle travel, approximately 60 percent of visitors engage in some type of OHV use. Campfires, camp stoves, and small portable generators are additional sources of emissions associated with recreational visitor activities. Vehicle engines, campfires, camp stoves, and portable generators are sources of both criteria pollutant and greenhouse gas emissions. Under Alternative B, 1,460,200 acres would be open to OHV use. An additional 5,445,218 acres would have OHV use restricted to existing roads. Under Alternative B, 24,832 acres would be closed to OHV use. Three new special recreation management areas would be designated, and there would be more visitor outreach and educational programs than under Alternative A. Although no visitor use projections are available, it is possible that Alternative B would have slightly higher visitor use and slightly lower OHV use levels than Alternative A. It is unclear whether overall visitor use would be higher or lower than under Alternatives C and D. OHV use levels under Alternative B may be slightly higher than those under Alternatives C and D and slightly lower than those under Alternative A. Because OHV activity emissions are likely to dominate overall recreation-related emissions, Alternative B may have slightly lower recreation-related emissions than under Alternative A and slightly higher recreation-related emissions than under Alternatives C and D.

Individual Effects under Alternative C

On-road and off-road vehicle use is the major source of air pollutant emissions associated with visitor activities. In addition to on-road vehicle travel, approximately 60 percent of visitors engage in some type of OHV use. Campfires, camp stoves, and small portable generators are additional sources of emissions associated with recreational visitor activities. Vehicle engines, campfires, camp stoves, and portable generators are sources of both criteria pollutant and greenhouse gas emissions. Under Alternative C, no areas in the WDO would be designated as open to OHV use, but 7,143,177 acres would have OHV use restricted to existing roads. Under Alternative C, 61,427 acres would be closed to OHV use. Under Alternative C, two new special recreation management areas would be designated, and there would be more visitor outreach and educational programs than under Alternative A. Although no visitor use projections are available, it is possible that Alternative C would have slightly higher visitor use than Alternative A and overall visitor use similar to Alternatives B and D. OHV use levels under Alternative C may be slightly lower than those under the other alternatives because there would be no areas open to off-road OHV use. Because OHV activity emissions are likely to dominate overall recreation-related emissions, Alternative C may have somewhat lower recreation-related emissions than the other alternatives.

Individual Effects under Alternative D

On-road and off-road vehicle use is the major source of air pollutant emissions associated with visitor activities. In addition to on-road vehicle travel, approximately 60 percent of visitors engage in some type of OHV use. Campfires, camp stoves, and small portable generators are additional sources of emissions associated with recreational visitor activities. Vehicle engines, campfires, camp stoves, and portable generators are sources of both criteria pollutant and greenhouse gas emissions.

Under Alternative D, 289,932 acres would be open to OHV use. An additional 6,878,592 acres would have OHV use restricted to existing roads. Under Alternative D, 35,483 acres would be closed to OHV use. Under Alternative D, three new special recreation management areas would be designated, and there would be more visitor outreach and educational programs than under Alternative A. Although no visitor use projections are available, it is possible that Alternative D would have slightly higher visitor use than Alternative A and overall visitor use similar to Alternatives B and C. OHV use levels under Alternative D may be slightly lower than those under Alternative B and slightly higher than those under Alternative C. Because OHV activity emissions are likely to dominate overall recreation-related emissions, Alternative D may have somewhat lower recreation-related emissions than Alternatives A and B and slightly higher recreation-related emissions than Alternative C.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Renewable energy programs include solar, wind, and biomass energy projects. The primary emissions impacts associated with solar and wind energy projects are related to fugitive dust and equipment engine emissions during facility construction and from vehicle traffic associated with facility operation and maintenance. Construction equipment and vehicle engines are sources of both criteria pollutant and greenhouse gas emissions. In addition to emissions from facility construction and operational traffic, biomass energy facilities would typically produce criteria pollutant and greenhouse gas emissions from fuel conversion processes or from direct biomass combustion. Any renewable energy project that would disturb more than 20 acres would be subject to Nevada surface area disturbance permit requirements and would require preparation of a fugitive dust control plan. Biomass energy projects would probably require a stationary source permit from the Nevada Bureau of Air Pollution Control.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Road maintenance activities and construction of new roadways would result in fugitive dust and equipment engine emissions. BLM road construction and road maintenance activities that would disturb more than 20 acres would be subject to Nevada surface area disturbance permit requirements and would require preparation of a fugitive dust control plan. Use of unpaved roadways in the WDO area would be an ongoing source of fugitive dust and vehicle engine emissions.

Effects from Lands and Realty Management

Effects Common to All Alternatives

While the alternatives differ in terms of policies and actions related to land sales and other land disposal actions, such actions and changes in land ownership per se have no air quality impacts. Because the eventual use of lands subject to disposal actions is not clear, no conclusions can be made concerning the indirect air quality effects of land sales and other land disposal actions. Other effects from lands and realty management are discussed separately for each alternative.

Individual Effects under Alternative A

Alternative A would not designate any lands as ROW avoidance or exclusion areas. Available information does not allow a determination of whether differences in the acreage of avoidance and exclusion areas would result in differences in air quality effects from future mineral and energy development.

Individual Effects under Alternative B

Alternative B would designate 716,528 acres as ROW avoidance areas but would not designate any lands as exclusion areas. Available information does not allow a determination of whether differences in the acreage of avoidance and exclusion areas would result in differences in air quality effects from future mineral and energy development.

Individual Effects under Alternative C

Alternative C would designate 869,645 acres as ROW avoidance areas and 1,279,481 acres as exclusion areas. Available information does not allow a determination of whether differences in the acreage of avoidance and exclusion areas would result in differences in air quality effects from future mineral and energy development.

Individual Effects under Alternative D

Alternative D would designate 1,325,967 acres as ROW avoidance areas and 699,929 acres as exclusion areas. Available information does not allow a determination of whether differences in the acreage of avoidance and exclusion areas would result in differences in air quality effects from future mineral and energy development.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

ACEC/RNA management policies have no identifiable air quality implications under any of the alternatives.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

There are no effects common to all alternatives from backcountry byways management.

Individual Effects under Alternative A

Alternative A would evaluate three new backcountry byways for possible designation. Designated backcountry byways may encourage some visitor use that would not otherwise occur, thus resulting in a minor increase in vehicle traffic and resulting fugitive dust and vehicle engine emissions. Thus, backcountry byway designations under Alternative A might result in a minor increase in emissions from visitor vehicle traffic. Emissions from backcountry byway use under Alternative A would probably be similar to those under Alternative D and perhaps slightly higher than those under Alternatives B and C.

Individual Effects under Alternative B

Alternative B does not identify any specific new backcountry byways for possible designation but would consider new backcountry byway designations to stimulate local economies. Designated backcountry byways may encourage some visitor use that would not otherwise occur, thus resulting in a minor increase in vehicle traffic and resulting fugitive dust and vehicle engine emissions. Thus, backcountry byway designations under Alternative B might result in a minor increase in emissions from visitor vehicle traffic. Emissions related to backcountry byway use under Alternative B would be slightly higher than those under Alternative C and slightly lower than those under Alternatives A and D.

Individual Effects under Alternative C

Alternative C do not identify any specific new backcountry byways for possible designation but would consider new backcountry byway designations for areas currently receiving visitor use if such designations would not pose a risk to resources. Designated backcountry byways may encourage some visitor use that would not otherwise occur, thus resulting in a minor increase in vehicle traffic and resulting fugitive dust and vehicle engine emissions. Alternative C is likely to result in fewer new backcountry byway designations and smaller increases in emissions from visitor vehicle traffic than the other alternatives.

Individual Effects under Alternative D

Alternative D would evaluate three new backcountry byways for possible designation. Designated backcountry byways may encourage some visitor use that would not otherwise occur, thus resulting in a minor increase in vehicle traffic and resulting fugitive dust and vehicle engine emissions. Thus, backcountry byway designations under Alternative D might result in a minor increase in emissions from visitor vehicle traffic. Emissions related to backcountry byway use under Alternative D would probably be similar to those under Alternative A and perhaps slightly higher than those under Alternatives B and C.

Effects from National Trails Management

Effects Common to All Alternatives

There are no effects common to all alternatives from national trails management.

Individual Effects under Alternative A

OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Under Alternative A, national historic trails and their viewsheds would remain open to OHV use. Consequently, Alternative A might produce slightly more OHV fugitive dust and engine emissions than Alternatives C and D and about the same amount of OHV fugitive dust and engine emissions as Alternative B.

Individual Effects under Alternative B

OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Under Alternative B, national historic trails and their viewsheds would remain open to OHV use. Consequently, Alternative B might produce slightly more OHV

fugitive dust and engine emissions than Alternatives C and D, and about the same amount of OHV fugitive dust and engine emissions as Alternative A.

Individual Effects under Alternative C

OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Under Alternative C, Class I segments of national historic trails would be closed to OHV use and other segments of national historic trails and their viewsheds would be classified as limited for OHV use. Consequently, Alternative C might produce slightly less OHV fugitive dust and engine emissions than Alternatives A and B and about the same amount of OHV fugitive dust and engine emissions as Alternative D. In addition, under Alternative C no mineral development surface occupancy would be allowed within a mile of the CNHT.

Individual Effects under Alternative D

OHV use generates fugitive dust and releases both criteria air pollutants and greenhouse gas pollutants from engine exhaust. Under Alternative D, Class I segments of national historic trails would be closed to OHV use and other segments of national historic trails and their viewsheds would be classified as limited for OHV use. Consequently, Alternative D might produce slightly less OHV fugitive dust and engine emissions than Alternatives A and B and about the same amount of OHV fugitive dust and engine emissions as Alternative C. In addition, under Alternative D no mineral development surface occupancy would be allowed within a mile of the CNHT.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

Wild and scenic rivers management policies have no identifiable air quality implications under any of the alternatives.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Wilderness and wilderness study areas management policies have no identifiable air quality implications under any of the alternatives.

Wilderness characteristics management policies have no identifiable air quality implications under any of the alternatives.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

Watchable wildlife viewing sites management policies have no identifiable air quality implications under any of the alternatives.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Public health and safety management policies have no identifiable air quality implications under any of the alternatives.

Effects from Sustainable Development Management

Effects Common to All Alternatives

There are no effects common to all alternatives from sustainable development management.

Individual Effects under Alternative A

Alternative A has no sustainable development policies and consequently would have no air quality impacts from sustainable development management.

Individual Effects under Alternative B

Alternative B incorporates sustainable development objectives for disposal and reuse of lands previously used for mineral development. Such reuse could establish new sources of emissions associated with stationary sources and vehicle traffic. Any new industrial operations would likely be subject to air permit requirements from the Nevada Bureau of Air Pollution Control.

Individual Effects under Alternative C

Alternative C incorporates sustainable development objectives for disposal and reuse of lands previously used for mineral development. Such reuse could establish new sources of emissions from stationary sources and vehicle traffic. Any new industrial operations would likely be subject to air permit requirements from the Nevada Bureau of Air Pollution Control.

Individual Effects under Alternative D

Alternative D incorporates sustainable development objectives for disposal and reuse of lands previously used for mineral development. Such reuse could establish new sources of emissions from stationary sources and vehicle traffic. Any new industrial operations would likely be subject to air permit requirements from the Nevada Bureau of Air Pollution Control.

Cumulative Effects

Air Quality Impacts

Cumulative air quality impacts typically occur when multiple projects affect the same geographic areas at the same time or when sequential projects extend the duration of air quality impacts on a given area over a longer period of time. In addition, attainment of national ambient air quality standards for ozone and particulate matter require evaluation of conditions over three years. Thus, air pollution emissions that occurred in the recent past can affect attainment or nonattainment designations. The available air quality monitoring information for the WDO area (see Section 3.2.1) does not reveal any distinct trends in terms of peak ozone or particulate matter concentrations.

Industrial source air permits issued under the prevention of significant deterioration (PSD) program require an analysis of cumulative air quality degradation in potentially affected areas since the first PSD program permit was issued for the area affected by the new proposed facility. PSD increments established in the federal Clean Air Act apply to emissions of nitrogen oxides, sulfur oxides, and particulate matter. If the increment consumption modeling analysis required for a new stationary source indicates that the allowable degradation increment has been used by the cumulative effect of past and present emission sources, the requested stationary source permit cannot be approved.

PSD increment consumption effects are the cumulative air quality consideration of greatest significance to the WDO area. PSD increments are established by hydrographic subarea. At present, most of the WDO area is not affected by emission sources that have triggered the tracking of nitrogen oxide, sulfur oxide, or particulate matter increment consumption. Six hydrographic subareas within the WDO area are currently subject to PSD increment consumption analyses under the PSD program: subarea 064 (Valmy area), subarea 072 (Imlay area), and four subareas that reach into the southern tip of the WDO area (subareas 076, 082, 083, and 101). PSD increment consumption issues have the potential for affecting future mineral and energy developments in portions of the WDO area.

Climate Change

Greenhouse gas emissions from sources within the WDO area will contribute to cumulative climate change effects occurring in the region. Sources of greenhouse gas emissions in the WDO area include fossil-fueled power plants, wildfires and prescribed burns, vehicles and OHVs, construction for mineral and energy development projects, operational activities for mineral and energy development projects, and grazing livestock, wild horses, and burros. To the extent that these activities increase, greenhouse gas emissions are also likely to increase.

Chambers (2008) notes that historical data shows an increase in mean annual temperature in the Great Basin, with most of the change resulting from higher minimum temperatures rather than higher maximum temperatures. Most portions of the Great Basin show a warming of 0.6 to 1.1 degrees F over the past century. Regional climate models typically predict an additional warming of 3.6 to 9 degrees F over the next century. Historical data also indicate an increase in annual precipitation amounts in the Great Basin over the past century, together with increased year-to-year variability in precipitation amounts, and a decrease in winter snowpack. These changes have resulted in earlier snowmelt, higher winter streamflow volumes, reduced spring peak volumes, and lower summer and fall streamflow volumes. Chambers (2008) also notes that while historical data indicate an increase in annual precipitation in the Great Basin, regional climate models tend to show little long-term change in precipitation amounts for the Great Basin as a whole, with some areas predicted to have increased precipitation amounts and other areas predicted to have reduced precipitation amounts.

Over the long term, climate change may have indirect effects on emissions from wildfires and prescribed burns in the WDO area. These changes may also have indirect effects from greenhouse gas emissions associated with livestock grazing and wild horse and burro populations. Climate change will alter temperature, precipitation, and snowpack conditions, resulting in changes to vegetation, streamflow, and the flow of springs. Vegetation changes will in turn have an effect on wildfire frequency and intensity, the necessity for conducting prescribed burns, and forage

availability. This could lead to changes in livestock grazing or changes in wild horse and burro populations. Climate change is likely to increase the spread of cheatgrass, which will increase the potential for wildfires. Increasing temperatures are likely to extend the duration of the wildfire season.

4.2.2 Geology

Summary

This section is a discussion of the potential impacts of the alternatives on the geology and unique geologic resources of the WDO. Areas with geologic resources considered to be potentially unique include Lake Lahontan shore features (e.g., gravel bars or shore terraces), Lake Lahontan tufa mounds, Humboldt Range Arch, columnar basalt near Lava Beds, McFarlane Hot Spring, the 1915 earthquake fault trace, Disaster Peak, Trego Mountain, and Pulpit Rock.

Impacts on geologic resources occur from large-scale surface disturbance, such as mining, erosion, off-road vehicles, excavation, and vandalism. Damage and vandalism are usually concentrated near roads and trails.

Methods of Analysis

Methods and Assumptions

The analysis of potential impacts on geologic resources is based on the expertise of BLM resource specialists at the WDO, review of existing literature, and geologic maps.

Specific impacts on geologic resources are not always readily identifiable because some impacts on geology are difficult to separate from impacts on other resources that geology supports. Thus, the impacts on geology are often discussed, either implicitly or explicitly, in the impacts section of other resources, such as paleontology and scenic quality (visual resources). Effects are quantified where possible; in the absence of quantitative data, best professional judgment was used.

The following assumptions regarding the resource base and management practices were considered in the analysis:

- The greatest potential for impacts would be from direct large-scale disturbance activities;
- All surface-disturbing activities include mitigation measures to reduce impacts on geologic resources. Analysis of impacts assumes that all mitigation measures are in place;
- Vandalism can destroy a feature or reduce its resource value (e.g., visual resources); and
- Education of the public increases support for protection of geologic resources but also increases visitation.

The area of analysis for cumulative effects on geologic resources is northwestern Nevada.

Effects from Air Quality Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from air quality management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Geology Management

Effects Common to All Alternatives

There are no effects common to all alternatives from geologic resource management.

Individual Effects under Alternative A

Other than maintaining current OHV use within exclusion zones, there are no set management objectives or actions in Alternative A concerning unique geologic resources. Mitigations and restrictions are determined on a case-by-case basis.

Individual Effects under Alternative B

Under Alternative B, the BLM would continue to evaluate sites containing unique geologic resources as to their significance and need for protection. Areas with unique geologic resources would remain open for all methods of mineral disposal, subject to mitigation measures sufficient to protect the values at risk. These measures include avoidance, reclamation, and other applicable use restrictions. Proposed activities that may impact unique geologic features would be authorized. Overall, unique geologic resources would be protected less under Alternative B than under Alternative A, where individual cases may include stronger limitations or mitigations.

Within areas with unique geologic resources, OHV use would be designated as "Limited" on existing roads and trails. OHV travel directly impacts the geologic resource through surface disturbance and increase in erosion. Damage and vandalism to geologic resources are usually concentrated near roads and trails due to larger number of visitors and higher frequency of visits. Impacts on unique geologic resources would be limited to those already damaged by existing roads and trails. Other geologic resources would be protected by these limitations, which would be greater than those under Alternative A, would be equivalent to those under Alternative D, and would be less than those under Alternative C. Materials would be produced and made available to educate the public about the unique geologic resources and encouraging them to visit and protect these resources.

Individual Effects under Alternative C

Under Alternative C, the BLM would continue to evaluate sites containing unique geologic resources as to their significance and need for protection. Areas with unique geologic resources would be designated as exclusion zones for ROWs and other discretionary actions, and the areas would be closed to salable mineral disposal. The areas would not be available for leasable minerals exploration and development, even with a no surface occupancy (NSO) stipulation. The unique geologic resources within the exclusion zones would be protected from degradation and impairment by

restricting all mining activities. The protection of the unique geologic resources would be greatest under Alternative C.

Proposed nondiscretionary activities that may affect geologic features would be authorized with appropriate mitigation measures to protect the values at risk, while discretionary activities that may affect geologic features would not be allowed.

Withdrawing these areas from the General Mining Law would be pursued. The size of any mineral withdrawal would be commensurate with what is desirable to protect the values requiring the withdrawal. The unique geologic resources within the mineral withdrawals would be protected from degradation and impairment.

Within the exclusion zones, OHV travel would be closed. OHV travel directly impacts the geologic resource through surface disturbance and increase in erosion. Damage and vandalism to geologic resources are usually concentrated near roads and trails due to larger number of visitors and higher frequency of visits. Impacts on unique geologic resources would be minimized. Other geologic resources would be protected by these limitations, which would be greater than those under Alternatives A, B, and D. Materials would be produced and made available to educate the public about the unique geologic resources and encouraging them to visit and protect these resources.

Individual Effects under Alternative D

Under Alternative D, the BLM would continue to evaluate sites containing unique geologic resources as to their significance and need for protection. Areas with unique geologic resources would be designated as exclusion zones for ROWs and other discretionary actions. The areas would be closed to salable mineral disposal but would be available for leasable minerals exploration and development, with a NSO stipulation. Proposed activities that may impact geologic features would be authorized with mitigation measures to protect the values at risk. Damage to unique geologic resources would be minimized. The protection of the unique geologic resources would be overall less than under Alternative C, where all mining activities would be restricted, but would be greater than Alternatives A and B.

The exclusion zones identified for unique geologic resources generally would be open for acquiring the rights to locatable minerals, but proposals for mineral operations in these areas would typically require special handling or would have additional limitations or stipulations applied to authorizations. The withdrawal of these areas from the General Mining Law would be pursued. The size of any mineral withdrawals would be commensurate with what is necessary to protect the values requiring the withdrawal. The unique geologic resources within the mineral withdrawals would be protected from degradation and impairment. These restrictions are equivalent to those under Alternative C and are greater than those under Alternatives A and B.

Within the exclusion zones, OHV travel would be designated as "Limited" on existing roads and trails. OHV travel directly impacts the geologic resource through surface disturbance and increase in erosion. Damage and vandalism to geologic resources are usually concentrated near roads and trails due to larger number of visitors and higher frequency of visits. Impacts on unique geologic resources would be limited to those already damaged by existing roads and trails. Other geologic resources would be protected by these limitations. These limitations would be greater than those under Alternative A, would be equivalent to those under Alternative B, and would be less than those

under Alternative C. Materials would be produced and made available to educate the public about the unique geologic resources and encouraging them to visit and protect these resources.

Effects from Soil Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from soil resources management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from water resources management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Forest/Woodland Products Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from forest/woodland products management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from weeds management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from chemical and biological control management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from rangeland management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from riparian and wetlands management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from fish and wildlife management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Special Status Species Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from special status species management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from wild horse and burro management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Wildland Fire Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from wildland fire management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Cultural Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from cultural resource management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Tribal Consultation Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from tribal consultation objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from paleontological resources management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Visual Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from visual resources management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from unique cave and karst resources management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from livestock grazing management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Minerals Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from minerals management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from recreation, visitor outreach, and services management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Renewable Energy Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from renewable energy management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Transportation and Access Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from transportation and access management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Lands and Realty Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from lands and realty management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from ACEC/RNA management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from backcountry byways management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from national trails management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from wild and scenic rivers management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from wilderness study areas or areas with wilderness characteristics management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from watchable wildlife viewing sites management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from public health and safety management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Effects from Sustainable Development Management

Effects Common to All Alternatives

There are no likely impacts on unique geologic resources resulting from sustainable development management objectives or actions under any of the alternatives. With respect to effects on unique geologic resources, all of the alternatives are essentially equivalent.

Cumulative Effects

Increased regulation and increased protection of other resources would result in less area being subject to surface-disturbing activities and activities with increased potential for erosion. These

changes would result in less general damage to unique geologic resources and would increase protection of specific identified resources.

4.2.3 Soil Resources

Summary

This section presents potential impacts of the alternatives on the soil resources in the WDO. (See Chapter 3 for a more detailed discussion of soil resources in the WDO.) Soil resources would be managed to maintain the natural habitat of the area and to minimize the potential for accelerated (human-caused) wind and water erosion. In order to maintain soil processes, a healthy, productive, and diverse plant community is necessary. Improved ecological condition would increase productivity, litter, soil biological crusts, soil fertility, infiltration, and nutrient cycling.

Methods of Analysis

Methods and Assumptions

The analysis of potential impacts on soil resources is based on the expertise of BLM resource specialists at the WDO and a review of literature and soil resource maps.

Impacts on soil resources are from management actions related to land use, grazing, fire management, recreation use, OHV travel, and other resources. Management actions for the other resources would vary the amount of land available for surface-disturbing activities and those that could impact the soil resources. Changing activities that would increase erosion would be mitigated by implementing BMPs and SOPs (Appendix B) through reclamation or environmental enhancement activities to stabilize or maintain soil processes. Effects are quantified where possible; in the absence of quantitative data, best professional judgment is used.

The following assumptions regarding the resource base and management practices were considered in the analysis:

- Wind erosion has the greatest impact on soil resources within the WDO. Actions that decrease the ability of the soil resources to withstand the wind have the greatest potential for impacts. These actions include those that remove existing vegetative cover or that actually disturb the soil itself.
- Roads and trails contribute to soil compaction and erosion. Higher road and trail densities would result in more adverse impacts on soil resources. Roads and trails that receive more traffic are at greater risk for soil erosion unless they are improved.
- All surface-disturbing activities include mitigation and SOPs and BMPs (Appendix B) to reduce impacts on soil resources.

The area of analysis for cumulative effects on soil resources is defined as the WDO. Approximately 88 percent of the RMP area is meeting the soil standard. Areas defined as not meeting the soil standard are "altered or disturbed land cover types" (eight percent) and "non-vegetated cover types" (four percent). Altered or disturbed land cover types include recent burns, mines or quarries, and invasive and noxious weeds species. Nonvegetated cover types include primarily dune lands and playas.

Effects from Air Quality Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from air quality management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent. Air quality mitigation measures include dust suppression requirements, which would reduce wind erosion of soils.

Effects from Geology Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from geology management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Soil Resource Management

Effects Common to All Alternatives

Small-scale activities, including monitoring activities, small construction, implementation, and maintenance activities, and fence building with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

Under all alternatives, erosion would be reduced on areas with a good perennial grass or forb understory (late seral). These areas are expected to be maintained and improved, resulting in reduced erosion, natural fire cycle returned, and reduced emergency stabilization. Also, burned area rehabilitation treatments would be reduced.

Research projects are encouraged in the WDO to gain a better understanding of the ecological processes and to improve rehabilitation and reclamation treatments. Research projects affect soil resources; those of less than 100 acres would have a negligible impact on soil resources, and research plots greater than 100 acres would have negligible or minor impact on soil resources, depending on the treatment implemented.

Individual Effects under Alternative A

Soil erosion would be reduced by maintaining and improving the vegetative cover in areas designated as having high erosion susceptibility. Natural processes, such as plant growth, litter accumulation, and biological crust formation would be encouraged; moisture retention in the soil resources would be maintained. BMPs and erosion control techniques, such as seeding, straw bales, and matting, would be required. Reduced erosion results in less impact on water courses and less burial of biological soil crusts and reduces loss of growth material.

Activities that would result in trampling or excessive shearing of biological soil crusts would be minimized, especially when soil surfaces are dry, as appropriate for the soil type. These actions would reduce the loss of biological soil crust and would protect against increased erosion and loss of growth media. These mitigations are greater than those discussed under Alternative B.

Land reclamation would be pursued in disturbed areas, thereby improving soil conditions. Reclamation conditions and methods are determined on a case-by-case basis.

The Sierra Front/NW RAC-RAC Standards and Guidelines and site-specific allotment objectives would be used for livestock grazing authorizations. These guidelines include specific directions to prevent erosion and protect soil resources.

Individual Effects under Alternative B

Soil erosion would be reduced by maintaining and improving the vegetative cover in areas designated as having high erosion susceptibility. The components of soil surface, vegetation, soil litter, and biologic crusts would be maintained or improved rather than just encouraged as under Alternative A, thereby increasing protection against erosion, increasing moisture retention, and improving the organic content of the soils. BMPs and erosion control techniques, such as seeding, straw bales, and matting would be required, further reducing erosion, burial of biological soil crusts, and loss of growth material.

No seasonal restrictions for activities that would result in compaction of soils with biological crusts would be applied. While multiple uses that could result in soil compaction would be allowed, adverse effects would be mitigated.

Land reclamation would be pursued in disturbed areas. The best available material for growth medium would be salvaged for surface disturbance and reclamation. Reclamation would improve the existing soil resources to conditions similar to those existing before the surface-disturbing activity. Soil amendments to improve the organic or nutrient or cohesive properties of the soils would not be applied.

The Sierra Front/NW RAC-RAC Standards and Guidelines and site-specific allotment objectives would be used for livestock grazing authorizations. These guidelines include specific directions to prevent erosion and protect soil resources. The guidelines would be applied in the same manner as under Alternative A.

Individual Effects under Alternative C

Soil processes would be maintained, protected, and improved in ways that are appropriate to soil types, climate, and land form. The vegetative cover would be improved by increasing litter, biological soil crusts, and vegetation as appropriate for soil type increasing protection against erosion, increasing moisture retention, and improving the organic content of the soil resources. These mitigations would be applied generally instead of just in areas designated as having high erosion susceptibility as under Alternatives A and B. BMPs (Appendix B), SOPs (Appendix B), and mitigation measures would be applied to all BLM and BLM-authorized activities to maintain, protect, or reduce adverse impacts on soil resources.

Surface disturbances to biological soil crusts would be eliminated or fully mitigated when the soil surfaces are dry. Surface disturbances within high potential biological crust areas would be seasonally eliminated, and soil resources would be protected from excessive compaction by implementing seasonal use restrictions. These actions would reduce the loss of biological soil crust and would

protect against increased erosion and loss of growth media. Moisture retention in the soils would be maintained. These mitigations are greater than those under Alternatives A, B, and D.

Reclamation would be required for all surface-disturbing activities. Growth medium for surface disturbance and reclamation would be salvaged or imported, and soil resources would be improved by applying natural or organic amendments. Importing growth media from within the individual mining areas would not result in disturbance and loss of growth media in other areas. Reclamation would improve the existing soils to conditions similar to or better than those existing before the surface-disturbing activity through the use of natural and organic soil amendments to improve the soil's organic or nutrient or cohesive properties. By applying the Land Health Standards (e.g., Sierra Front/NW RAC Standards and Guidelines and site-specific allotment objectives) to land use authorizations instead of just livestock grazing authorizations, as under Alternatives A and B, a larger amount of soils would be protected and impacts on soil resources would be minimized.

Individual Effects under Alternative D

Soil processes would be maintained, protected, and improved in ways that are appropriate to soil types, climate, and land form. The vegetative cover would be improved by maintaining existing vegetative cover, litter, biological soil crusts, and vegetation, as appropriate for soil type, increasing protection against erosion, increasing moisture retention, and improving the organic content of the soil resources. BMPs (State of Nevada), SOPs (Appendix B), and mitigation measures would be applied to all BLM and BLM-authorized activities to maintain, protect, or reduce adverse impacts on soil resources. These mitigations are equivalent to those under Alternative C.

Activities that would include trampling or excessive shearing of biological soil crusts would be minimized in areas having inadequate surface litter or vegetation cover. Moist soils with high compaction potential from surface disturbance activities would be protected by implementing seasonal use restrictions on a case-by-case basis. These mitigations are greater than those under Alternatives A and B but are less than those under Alternative C.

Surface-disturbing activities would be managed to ensure reclamation, where appropriate. The best available material for growth medium would be salvaged for surface disturbance and reclamation. Soil resources would be improved by applying soil amendments (fertilizers, mulch), where appropriate.

By applying the Land Health Standards (e.g., Sierra Front/NW RAC Standards and Guidelines and site-specific allotment objectives) to land use authorizations, instead of just livestock grazing authorizations, as under Alternatives A and B, a larger amount of soil resources would be protected and impacts on soil resources would be minimized.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from water resources management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent. Priority watersheds may reduce the levels or degree of soil disturbance to ensure that actions are compatible with the original purpose of the priority watershed.

Effects from Vegetation—Forest/Woodland Products Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from forest/woodland products management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent. Vegetation treatments may expose soils to wind or water erosion, and impacts would depend on the nature and degree of disturbance.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from weeds management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no effects common to all alternatives from chemical and biological control management.

Individual Effects under Alternative A

Alternative A would allow the use of herbicides and pesticides. Herbicides would produce small quantities of soil pollutants, which would dissipate in the long term. Pesticides would produce small quantities of volatile organic compounds, which would dissipate in the long term. Chemical impacts from the use of herbicides and pesticides are minor.

Individual Effects under Alternative B

Alternative B would allow the use of herbicides and pesticides. Herbicides would produce small quantities of soil pollutants, which would dissipate in the long term. Pesticides would produce small quantities of volatile organic compounds, which would dissipate in the long term. Chemical impacts from the use of herbicides and pesticides are minor.

Individual Effects under Alternative C

No herbicides or pesticides would be used under Alternative C, thereby eliminating the release of volatile organic compounds into soil resources.

Individual Effects under Alternative D

Alternative D would allow the use of herbicides and pesticides. Herbicides would produce small quantities of soil pollutants, which would dissipate in the long term. Pesticides would produce small quantities of volatile organic compounds, which would dissipate in the long term. Chemical impacts from the use of herbicides and pesticides are minor.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Small-scale activities, including livestock impoundments, vegetation mowing, and seed collection, with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

Grazing plans or grazing permit renewals or annual grazing authorizations would identify actions to maintain or improve soil conditions.

Individual Effects under Alternative A

Vegetation cover under Alternative A is improved by using a diversity of native and introduced grasses, forbs, and shrub seeds and seedlings. Under Alternative A, native seed is preferred over introduced seed. Vegetation objectives are based on maintaining and improving desirable perennial vegetation cover and densities. Alternative A identifies cover and density objectives to be met over three years for emergency stabilization and burn area rehabilitation. As discussed under Effects from Soil Resource Management above, the Sierra Front/NW RAC-RAC Standards and Guidelines and site-specific allotment objectives would be used for livestock grazing authorizations. These guidelines include specific directions to prevent erosion and protect soil resources.

Alternative A has a greater reduction in erosion than Alternative B. Vegetation management objectives are more stringent under Alternative A than under B. Soil processes would be improved at a faster rate than under Alternative B.

Individual Effects under Alternative B

Vegetation cover under Alternative B is improved by using introduced grasses, and forbs. Under Alternative B, primarily introduced seed would be used. Vegetation objectives are based on maintaining and improving desirable perennial vegetation cover and densities. As discussed under Effects from Soil Resource Management above, the Sierra Front/NW RAC- Standards and Guidelines and site-specific allotment objectives would be used for livestock grazing authorizations. These guidelines include specific directions to prevent erosion and protect soil resources. The guidelines would be applied in the same manner as under Alternative A.

Alternative B has a two-year closure for livestock/WHB grazing to reduce cheatgrass. Seeding success is anticipated to be less than 20 percent under Alternative B versus greater than 75 percent under Alternative A.

Individual Effects under Alternative C

Under Alternative C, rehabilitation seedings would be limited based on the amount of native seed available. In most years, native seed supplies are exhausted because of demand, so large areas would be untreated and would be dominated by invasive plants. Most of the vegetation communities do not have the potential for natural recovery because they lack perennial understory grasses and forbs. Under Alternative C, wildland fires would increase and expand, resulting in increased erosion. Alternative C, Option 1, five-year livestock/WHB grazing fire closure, would not improve soil

processes where desirable perennial understory plants are lacking. Alternative C, Option 2, elimination of livestock grazing, would increase fuels on areas lacking potential for natural recovery. Objectives for soil resources are most stringent under Alternative C. Prescribed fire would not be used under Alternative C, so potential erosion from prescribed fire would be eliminated.

As discussed under Effects from Soil Resource Management above, applying the Land Health Standards (e.g., Sierra Front/NW RAC Standards and Guidelines and site-specific allotment objectives) to land use authorizations instead of just livestock grazing authorizations, as under Alternatives A and B, a larger amount of soils would be protected and impacts on soil resources would be minimized. Alternative A has a greater reduction in erosion than Alternative C.

Individual Effects under Alternative D

Vegetation cover under Alternative D is improved by using a diversity of native and introduced grasses, forbs, and shrub seeds and seedlings. Under Alternative D, native seed is preferred over introduced seed. Vegetation objectives are based on maintaining and improving desirable perennial vegetation cover and densities. Under Alternative D, an increase in perennial vegetation would reduce erosion by increasing desirable cover and would increase years between fires (fire cycle) by reducing annual invasive species. As discussed above, under Effects from Soil Resource Management, applying the Land Health Standards (e.g., Sierra Front/NW RAC Standards and Guidelines and site-specific allotment objectives) to land use authorizations instead of just livestock/WHB grazing authorizations, as under Alternatives A and B, a larger amount of soils would be protected and impacts on soil resources would be minimized.

Under Alternative D, desirable perennial vegetation cover would increase, reducing erosion, and the fire cycle would be reduced. Desirable perennial vegetation would improve under Alternative D at a faster rate than under Alternative A. Vegetation management objectives are more stringent under Alternative D than A.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from riparian and wetlands management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent. Managing stream bank alteration and trampling would reduce impacts on soils within riparian areas.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Small-scale activities, including wildlife water development with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

There are no likely impacts on soil resources resulting from fish and wildlife management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Special Status Species Management

Effects Common to All Alternatives

Where the individual species and habitat management plans include grazing restrictions and vehicle use restrictions, their implementation would protect soil resources by reducing loss of vegetative cover, direct disturbance of soils, and trampling of biological crusts. Otherwise, there are no likely impacts on soil resources resulting from special status species management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Small-scale activities, including wild horse and burros gathers and trap sites with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

There are no likely impacts on soil resources resulting from wild horse and burro management objectives or actions at or below AML under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildland fire within the WDO reduces plant cover, litter, and biological soil crust, making soil resources highly susceptible to erosion. Emergency stabilization and burned area rehabilitation treatments would be implemented to reduce these impacts. Wildland fire increases wind erosion, which may be a minor to substantial impact on public health, depending on fire location, especially among sensitive groups, such as children, the elderly, or individuals with asthma or emphysema. Wildland fire increases water erosion, which may be either a minor or greater impact. Impacts from erosion are greatest the first year after the fire, diminishing to minor after three years as vegetation is reestablished. Water erosion can be substantial on limited areas, especially if the sediment impacts residential or industrial areas and transportation systems. These impacts would occur until vegetation becomes fully established.

Fire impacts would include reduced soil nutrients from wind and water erosion, loss of shrubs or deep-rooted plants, reducing nutrient cycling, reduced vegetation productivity, increased compaction from loss of surface litter, and reduced organic matter and elimination of biological crusts, reducing nutrient capture.

Initiation of the actions would ensure timely stabilization of watersheds, reduced flood hazards, replacement or reestablishment of vegetation through seeding or recovery of perennial plants. The reestablishment of vegetative cover, litter, and viable root mass would reduce the impacts of wind and water erosion. Stabilization of watersheds would prevent undue loss of topsoil, and site potential would be maintained. Short-term increases in water and wind erosion are unavoidable in the first year following a wildfire.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Small-scale activities, including excavations of cultural resources sites for data recovery with less than one acre of surface disturbance involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

Effects from Tribal Consultation Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from tribal consultation objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Small-scale activities, including excavations of paleontology sites for data recovery with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

There are no likely impacts on soil resources resulting from paleontological resources management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Visual Resources Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from visual resources management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from soil resources management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

The impacts of grazing to soils are discussed above in the larger context of Effects from Soil Resource Management and Effects from Vegetation - Rangeland Management.

Effects from Minerals Management

Effects Common to All Alternatives

Construction activities that involve geothermal, oil and gas, and mine development, material pits and power plants would remove vegetation, thereby increasing erosion and soil compaction in the short term. Erosion would involve impacts from negligible to greater, depending on the level of disturbance and the soil type. Long-term mitigations and reclamation are common to all alternatives. With reclamation and mitigation, impacts would be minor. Differences among types and degree of reclamation and mitigations are discussed below.

Individual Effects under Alternative A

Mine operators would be encouraged to minimize disturbance to biological soil crusts and to reduce soil erosion by using BMPs (Appendix B), SOPs (Appendix B), and erosion control techniques, such as seeding, placing straw bales, and matting. The BLM would pursue land reclamation in disturbed areas.

Under Alternative A, 418,938 acres would be closed to salable mineral disposition, 446,887 acres would be closed to fluid leasable minerals activities, 416,652 acres would be closed to solid leasable minerals activities, and 6,543 acres would be withdrawn from locatable mineral activities. Soil resources would be protected from related mineral development within these areas, reducing the potential for impacts.

Individual Effects under Alternative B

Mine operators would be encouraged to minimize disturbance to biological soil crusts and to reduce soil erosion by using BMPs and erosion control techniques, such as seeding, placing straw bales, and matting. Multiple uses would be allowed with mitigations without seasonal closures. The BLM would pursue land reclamation in disturbed areas. Those involved in surface-disturbing activities would be required to salvage the best available material for use as growth medium for reclamation. Soil resources in any areas with limitations on surface disturbance would be protected (see detail below).

Under Alternative B, 418,938 acres would be closed to salable mineral disposition, 1,132,594 acres would be closed to fluid leasable minerals activities, 1,124,266 acres would be closed to solid leasable minerals activities, and 6,543 acres would be withdrawn from locatable mineral activities. Soil resources would be protected from related mineral development within these areas, thereby reducing the potential for impacts. Alternative B includes the same amount of land closed to the various mining activities, except for solid leasable minerals activities. For these mineral activities, more area would be closed under Alternative B than under Alternative A.

Individual Effects under Alternative C

Mining activities would be required to maintain, protect, or reduce adverse impacts on soil resources. Surface disturbances within high potential biological crust areas would be seasonally eliminated. The BLM would require that all land where the surface has been disturbed to be reclaimed, which would require salvaging or importing growth medium. Soil resources in any areas with limitations on surface disturbance would be protected (see detail below).

Under Alternative C, 837,049 acres would be closed to salable mineral disposition, 4,455,028 acres would be closed to fluid leasable minerals activities, 4,455,645 acres would be closed to solid leasable minerals activities, and 281,892 acres would be withdrawn from locatable mineral activities. Soil resources would be protected from related mineral development within these areas, thereby reducing the potential for impacts. More land would be closed to the various types of mining activities under Alternative C than under Alternatives A, B, or D.

In addition, the area of the George Lund Petrified Forest mineral withdrawal would be enlarged to a total of 141 acres, further reducing potential impacts on soil resources.

Individual Effects under Alternative D

Mining activities would be encouraged to maintain, protect, or reduce adverse impacts on soil resources. Where appropriate, the BLM would manage surface-disturbing activities to ensure reclamation. Those engaged in surface-disturbing activities would be required to salvage the best available material for use as growth medium for reclamation. Soil resources located in any areas with limitations on surface disturbance would be protected (see detail below).

Under Alternative D, 743,301 acres would be closed to salable mineral disposition, 1,198,464 acres would be closed to fluid leasable minerals activities, 1,198,694 acres would be closed to solid leasable minerals activities, and 27,941 acres would be withdrawn from locatable mineral activities. Soil resources would be protected from related mineral development within these areas, reducing the potential for impacts. More land would be closed to the various types of mining activities under Alternative D than under Alternatives A or B, but less land than under Alternative C.

In addition, the area of the George Lund Petrified Forest mineral withdrawal would be enlarged to a total of 141 acres, further reducing potential impacts on soil resources.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

SRMAs are public land units that provide specific structured recreational activities, experience, and benefit opportunities. Increased areas designated as SRMAs could affect soils by increased vehicle and pedestrian traffic and associated increases in compaction and erosion. Mitigations, including limits to new roads, vehicle access, trails, and activities, would be considered to limit impacts on resources. Impacts from OHV use are discussed below. There are no likely impacts on soil from recreation, visitor outreach, and services management objectives or actions under any of the alternatives.

Individual Effects under Alternative A

Alternative A includes only the existing Pine Forest SRMA (37,259 acres) and would result in the least soil disturbance associated with SRMAs. Under Alternative A, OHV use is the least restricted which would result in a minor increase in erosion over the other alternatives. Under Alternative A, the Winnemucca Sand Dunes RMZ would not be implemented resulting in less erosion in that specific area.

Individual Effects under Alternative B

Under Alternatives B and D, the new SRMAs of Winnemucca (151,824 acres), Granite Range (95,972 acres), and Nightingale (925,593 acres) would be designated, and the Pine Forest SRMA would be expanded to 98,874 acres. Through increased vehicle and pedestrian traffic and associated increases in compaction and erosion, these alternatives would have the most impact on soils associated with SRMAs. Under Alternative B, the Winnemucca Sand Dunes RMZ would be implemented and OHV use would increase, thereby increasing the potential impact on soil resources by removing vegetation and increasing blowing soil to State Highways 95 and Delaney subdivision.

Individual Effects under Alternative C

Under Alternative C, the new SRMAs of Winnemucca (151,824 acres) and Granite Range (95,972 acres) would be designated. The Pine Forest SRMA would be expanded to 98,874 acres and would have more impacts on soils associated with SRMAs, through increased vehicle and pedestrian traffic and associated increases in compaction and erosion, than under Alternative A but fewer impacts than under Alternatives B and D. Under Alternative C, OHV use would be restricted, having least impact on soil resources. Under Alternative C, the Winnemucca Sand Dunes RMZ would not be implemented resulting in less erosion in that specific area.

Individual Effects under Alternative D

Under Alternatives B and D, the new SRMAs of Winnemucca (151,824 acres), Granite Range (95,972 acres), and Nightingale (925,593 acres) would be designated, and the Pine Forest SRMA would be expanded to 98,874 acres. Through increased vehicle and pedestrian traffic and associated increases in compaction and erosion, these alternatives would have the most impact on soils associated with SRMAs. Under Alternatives B and D, the Winnemucca Sand Dunes RMZ would be implemented and OHV use would increase, thereby increasing the potential impact on soil resources by removing vegetation and increasing blowing soil to State Highways 95 and Delaney subdivision.

Effects from Renewable Energy Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from renewable energy management objectives or actions under any of the alternatives. Implementing any projects would include project-specific mitigation and impacts. With respect to the effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Roads and trails contribute to soil compaction and erosion; higher road and trail densities would result in more adverse impacts on soil resources; roads and trails that receive more traffic are at greater risk for soil erosion.

Small-scale activities, including road maintenance with less than one acre of surface disturbance, involve short-term increases in erosion and soil compaction. Due to the small size of the areas, these activities would have negligible impacts on soil resources.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Various construction activities and rights-of-way authorized under lands and realty management (such as geothermal and wind power, communication sites, transmission lines, and pipeline projects) would impact soil resources. Land sales could affect soil resources by changing the vegetative cover through agricultural, urbanization, or industrial development. Erosion would increase during construction and would be short term. Erosion would involve impacts from negligible to greater, depending on the level of disturbance and the soil type.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

Under all alternatives, the BLM would continue to maintain the Osgood Mountains ACEC as closed to mineral disposal (salables). The proposed ACECs and the Osgood Mountains ACEC would continue to be open for acquiring rights to locatable minerals but would have additional limitations or stipulations applied to operations authorizations. The BLM would continue to pursue a mineral withdrawal for the Osgood Mountains ACEC. The Pine Forest mineral withdrawal and designated WSAs would be closed to salable mineral activities.

Other than the conditions discussed above, there are no restrictions under any of the alternatives to the amount of land open to mining or limits to mining, based on ACEC/RNA management objectives or actions. The impacts from mining and the mitigations and reclamation requirements are discussed under Effects from Soil Resource Management and Effects from Minerals Management above. Erosion would be mitigated by implementing BMPs (Appendix B) and SOPs (Appendix B) through reclamation or environmental enhancement activities to stabilize or maintain soil processes.

There are no likely impacts on soil resources resulting from ACEC/RNA management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from backcountry byways management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from national trails management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from wild and scenic rivers management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from wilderness, wilderness study areas, or areas with wilderness characteristics management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from watchable wildlife viewing sites management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There are no likely impacts on soil resources resulting from public health and safety management objectives or actions under any of the alternatives. With respect to effects on soil resources, all of the alternatives are essentially equivalent.

Effects from Sustainable Development Management

Effects Common to All Alternatives

The identified sustainable development projects all involve areas where the soil resources have already been disturbed. Through concentrating efforts to reuse areas, disturbance to soils would be less because already disturbed areas would be used instead of disturbing new areas. Soils would remain vulnerable to erosion over a longer period of time in reuse areas. These impacts would be reduced, subject to concurrent reclamation. There are no likely impacts on soil resources resulting from sustainable development management objectives or actions under any of the alternatives.

Individual Effects under Alternative A

Other than the conditions discussed above, under Alternative A, there are no likely impacts on soil resources resulting from sustainable development management objectives or actions. With respect to effects on soils resources, Alternatives A, C, and D are essentially equivalent.

Individual Effects under Alternative B

Under Alternative B, guidance and standards for reclamation and closure, for operators of sites that have a reasonable prospect for economic use, would be deferred or delayed for up to five years from the end of active mining. Soils in reuse areas would remain vulnerable to erosion over a longer period of time under Alternative B, which would be less protective of soils resources than would Alternatives A, C, and D.

Individual Effects under Alternative C

Other than the conditions discussed above, there are no likely impacts on soil resources resulting from sustainable development management objectives or actions under Alternative C. With respect to effects on soils resources, Alternatives A, C, and D are essentially equivalent.

Individual Effects under Alternative D

Other than the conditions discussed above, there are no likely impacts on soil resources resulting from sustainable development management objectives or actions under Alternative D. With respect to effects on soils resources, Alternatives A, C, and D are essentially equivalent.

Cumulative Effects

Increased regulation and protection of other resources would result in less area being subject to surface-disturbing activities and activities that would increase the potential for erosion. These changes would result in less general damage to soil resources and biological crusts.

Upward trends in populations within the WDO create the potential for long-term additional increases in soil disturbance from activities on the public land. Erosion from these activities would increase over time for all alternatives.

Future activities from livestock grazing, mining, recreation, road construction and maintenance, and vegetation projects would continue to impact the soil resources within the impact assessment area. Impacts from grazing are likely to change and would continue to improve. Impacts from mining would be mitigated, except for pits. Road construction or maintenance would slightly increase, and impacts from recreation would moderately increase from the past and present conditions. Man-made fires and wildfires have increased, impacting soil resources, and are anticipated to increase in the future.

4.2.4 Water Resources

Summary

The mandate to manage the land for multiple uses requires the BLM to consider some uses that have the potential to degrade water quality. Minimizing such impacts is a common theme of all of the alternatives. Actions that increase the intensity of land use, or that would introduce new or larger sources of pollutants into new or existing use areas, could adversely impact water resources. Activities as far ranging as recreation, mineral extraction, road construction, grazing, and energy production all have potential to adversely impact water resources. Activities that disturb soils or reduce vegetation cover can lead to increased erosion, which in turn may result in more sediment being carried to streams or other surface water bodies.

The BLM has little direct control over water supply, but mineral leasing activity and recreational development can result in increased demand for water and in some cases may be constrained by available water supplies. For example, geothermal energy production requires extraction of groundwater, usually from deep saline aquifers. Some of this water is consumed, and some can be reinjected and recirculated in the aquifer. However, if more water is consumed than is recharged, then the volume of the geothermal aquifer will be drawn down. The BLM's role is to enable geothermal resources on public lands to be identified and used in a sustainable fashion, but the BLM has no direct control over the issuance of water rights to the geothermal water and relies on the State of Nevada to ensure that the groundwater resource is not over-allocated.

Each alternative has a different emphasis, which is expected to result in different priorities for resource development. These priorities are expected to result in higher probabilities for adverse impacts on water resources under some of the alternatives.

Alternative A represents current management under guidance of the 1982 Sonoma-Gerlach and Paradise-Denio Management Framework Plans and the amendments of 1999. Alternative A contains fewer, and generally less specific, management actions than the other alternatives. In some cases this is because new objectives have been formulated based on experience gained under the previous plans. In other cases, new or different management options have been formulated to address existing objectives that are carried forward in the RMP. Where Alternative A is silent about a new objective or less specific regarding existing objectives, this does not mean that the issues identified under the other alternatives would not be addressed under Alterative A. Without the guidance offered by an updated management plan, not only would Alternative A allow the BLM more latitude in addressing these issues, but the lack of guidance would also make it more difficult to implement actions that were not anticipated when the MFPs were developed. This is especially true in cases where there is disagreement among stakeholders about the direction that should be taken to address resource management issues. In some cases, preferences would be determined through public participation during preparation of project-specific NEPA documents.

Alternative B generally prioritizes development of resources for economic return while relying on mitigation to reduce, rather than prevent, adverse impacts. Alternative B would likely have greater impacts on water quality than would Alternatives C and D.

Alternative C is the most protective of water resources because it involves the least new development, exclude potentially impactful uses, and prioritize protection and restoration of resources when conflicts among uses occur. As one measure of the difference between Alternatives B and C on water quality, Alternative C would reduce road use, resulting in less potential for associated erosion impacts. However, some management actions under Alternative C may also enhance impacts on water resources. For example, less aggressive fire management and greater reliance on natural processes could lead to greater potential for large fires in the short term and associated short-term adverse impact on water resources.

Alternative D is less didactic in its overall approach, alternatively emphasizing development priorities or preservation priorities according to resource realm. Alternative D therefore represents a compromise, and its impacts on water resources are expected to be generally intermediate between Alternatives B and C. Overall, it tends to encourage economic development, but recognizes sensitive

environmental concerns on a greater amount of land area, resulting in more acres excluded or restricted from conflicting uses than Alternative B.

Methods of Analysis

Methods and Assumptions

The management actions for each resource were compared to identify differences, which, where they occur, are usually differences of degree. Actions that would increase demand for water could have significant impacts in basins or watersheds where committed water rights allocations are already near the perennial yield. Alternatives with lower potential for soil disturbance are generally expected to result in fewer indirect impacts on water quality from sediment and nutrient loading. Alternatives with lower potential for introducing new sources of chemical inputs are generally expected to have lower potential for water quality degradation.

Effects from Air Quality Management

Effects Common to All Alternatives

Impacts on water quality may result from deposition of contaminants onto the land or directly into water bodies. Mercury, for example, is a volatile heavy metal that has historically been used in the gold mining industry to extract gold from ore. Microscopic droplets of mercury vapor can become airborne but gradually settle to the ground at some distance from the source. Most of the mercury is recovered and reused in modern mining operations, but emission controls were not as effective in the past. The WDO and adjacent areas contain mercury ore deposits where historic mercury mining operations and recovery of mercury resulted in releases, including atmospheric releases. Similarly, mercury vapor has been released to the atmosphere from gold ore processing. As a result of this (and in addition to waste mercury that is directly deposited on tailings piles with processed slag), some of this mercury eventually makes its way to streams and lakes where it can become concentrated in sediments or can be taken up by aquatic biota.

Compliance with applicable regulatory requirements is expected to continue to result in emission of fewer pollutants as air quality standards become increasingly more stringent, tracking of emissions inventories improves, and technologies (stack gas scrubbers, alternative processes that emit fewer pollutants) improve. Although all of the alternatives would comply with applicable regulatory standards, differences may occur in the amounts and types of atmospheric emissions that would occur under each alternative, with potential indirect effects on water quality. There is little available information about the impacts of air pollutants on water quality in the WDO. It is difficult to differentiate the impacts on water quality from air deposition of mercury versus disposal of mercury-containing waste tailings. In general, the effects on water resources from atmospheric pollutants are expected to be small under all of the alternatives.

Individual Effects under Alternative A

Under current management, the primary sources of emissions that may impact water quality include particulates from fires, vehicle exhaust emissions, emissions from mining operations (mercury, volatile organic compounds), and wind erosion. Fire has the potential to generate carcinogens, such as dioxins, polycyclic aromatic hydrocarbons (PAHs), and other combustion products, trace concentrations of which may then be transported to water and aquatic sediment. Wind erosion can

generate dust that transports agricultural chemicals that may have been applied to crops, or herbicides applied to control weeds, some distance from the point of application where the chemicals or their degradation products, if persistent, may contribute to contamination of water or sediments.

Individual Effects under Alternative B

Alternative B emphasizes economic development of mineral and other resources, which has the potential to result in more new fixed emissions sources (generators, mineral processing sites, and more nonpoint mobile emissions sources (automobiles, OHVs, campfires, herbicide applications) than the other alternatives. While each of the sources may be in compliance with regulatory requirements, the cumulative effect of more sources could be an increase in trace concentrations of pollutants in water bodies.

Individual Effects under Alternative C

Alternative C places the most restrictions on resource uses and therefore would result in the lowest potential for emissions of human-made air pollutants. Alternative C involves reliance on more natural fire management and less active fire suppression, which could initially result in larger or more destructive fires, with the potential for more deposition of the products of combustion onto land and eventually into receiving waters.

Individual Effects under Alternative D

Alternative D allows the most flexibility in managing the development of resources and is therefore likely to result in more new emissions sources than Alternative C but fewer than Alternative B. Similarly, fire management and herbicide use are likely to result in effects that are intermediate between Alternatives B and C.

Effects from Geology Management

Effects Common to All Alternatives

The impacts of geology management on water resources would be indirect. Protecting sites or features of special geologic value would tend to reduce or restrict development of mineral resources and to limit any activities that might be destructive of the noneconomic values of the geologic resource. It would also tend to emphasize visitor uses of the protected areas. As discussed in other sections, such as mineral resources, resource development may indirectly impact water resources by introducing sources of pollutants to the development site that can be transported to a water body, or it may increase the potential for soil erosion. Increased visitor use to a site can also result in the following:

- Impact water resources, for example by increasing the potential for fires, which can lead to increased soil erosion and can contaminate water;
- Increase the need for facilities and infrastructure (such as roads, campgrounds, and trails), which require construction and can lead to increased erosion impacts or introduce contaminants to an area;
- Increase demand for potable water and the need for springs or wells; and

- Introduce pathogens associated with sanitary waste, garbage disposal, or development of water recreation facilities near the protected site.

The same specific geologic features have been identified for protection under Alternatives A, B, and C, but these alternatives differ in the degree, nature, and emphasis of protection measures that would be implemented.

Individual Effects under Alternative A

Alternative A does not identify or provide protections for specific unique geologic resources, but each project would be evaluated on its own merits to determine if such resources are present and should be protected, resulting in the greatest risk to water quality from the indirect impacts identified above. However, impacts are expected to be negligible since water resource protections are incorporated into existing regulatory and permit requirements and would be limited to effects resulting from accidents or inadequate planning.

Individual Effects under Alternative B

Alternative B identifies specific geologic features for protection. The effects on water resources are similar to those under Alternative A. This is because neither alternative would limit methods of mineral disposal or other uses that could be implemented in the protected areas and would use the minimum level of mitigation needed to protect the resource value at risk. While sufficient, the minimum level of mitigation allows for greater risk of unanticipated effects. Alternative B is less restrictive on reclamation, rehabilitation, and livestock grazing than the other alternatives, and fewer restrictions could result in greater potential for soil erosion. The potential for indirect effects from soil erosion related to OHV use is less under Alternative B than Alternative A because Alternative B limits OHV use to existing roads and trails, while Alternative A does not provide these limits. Alternative B would encourage visitors through information and publications, which could result in greater potential for the impacts of visitor use described above. In contrast, Alternative C would do less to encourage visitor use.

Individual Effects under Alternative C

Salable mineral activity would be excluded, leasable minerals would be subject to "No Surface Occupancy," and the BLM would pursue a mineral withdrawal of the lands containing unique geological resources from the General Mining Law. Each of these types of use restrictions would result indirectly in protecting water resources from indirect effects, such as erosion and sedimentation or point and nonpoint pollutant discharges that may be associated with the activity. Because mineral activity is likely to have the greatest potential for impacts on water resources (compared to OHV use or recreational use), these alternatives provide the highest amount of protection and least potential for impacts on water resources.

Individual Effects under Alternative D

The effects are nearly the same as those under Alternative C; except that Alternative D would provide fewer restrictions on OHV use than Alternative C (it would provide the same limitations on OHV use as under Alternative B).

Effects from Soil Resources Management

Effects Common to All Alternatives

The most important concern to water resources is soil erosion. Soil erosion is a natural process and occurs under natural conditions at varying rates, dependent on geology, climate, slope, vegetation cover, and many other factors. One of the functions of streams is to transport sediment. The sediment carrying capacity of a stream increases with flow. Streams in desert regions tend to decrease in velocity and power to transport sediment as they reach lower elevations, depositing their sediment loads onto alluvial fans or playas at the base of the mountain ranges where they originate. Many streams are ephemeral and carry flows only after the spring thaw or for short periods following local thunderstorms. Desert streams tend to carry high sediment loads during these brief high flow periods. Many streams within the WDO have perennial flows only in the upper watersheds.

Soil disturbance and removal of vegetation cover tends to make soils more vulnerable to water erosion. However, the effects of increased erosion rates on water quality or morphology of streams at lower elevations where most streams tend to be ephemeral are very different from the effects on streams at higher elevations in the upper watersheds, where the streams tend to be perennial. Ephemeral streams tend to be highly turbid when they are flowing because they flow only when discharge rates are high enough to transport sediment. Ephemeral streams frequently migrate and cut new channels, resulting in a braided channel system on alluvial fans. Perennial streams or stream segments tend to form established channels. Riparian vegetation becomes established along these channels. During periods of high spring runoff or after thunderstorms, these streams also carry high flows supplemented by overland flow from the surrounding watershed, and the water may become briefly turbid from the increased sediment load. However, at most times, the flow of water to these perennial streams from shallow groundwater and springs is moderate and clear.

Soil disturbance caused by human activities or livestock can alter drainage patterns, remove protective vegetation, and expose soils to erosion by wind and water. Sediment loading to streams can increase as a result, leading to increased turbidity and sedimentation. Both can adversely impact aquatic biota. Sedimentation can lead to more frequent flooding. Nutrients or chemicals contained in soils may be transported with soil particles, leading to increased algal production and reduction in dissolved oxygen concentrations.

Actions that protect and stabilize soils are expected to have beneficial impacts on water resources under each of the alternatives because they would reduce soil erosion. The alternatives differ in degree and probability of effectiveness.

All of the alternatives include the basic soil management actions of Alternative A, such as reducing soil erosion by maintaining or improving vegetation cover, using existing standards and guidelines for livestock grazing, implementing BMPs, "pursuing" land reclamation in "disturbed areas," and minimizing disturbance of biological soil crusts. The other alternatives go farther than Alternative A in identifying additional soil conservation measures.

Individual Effects under Alternative A

Alternative A relies on a basic set of measures included in all of the alternatives to conserve soil, but does not specify some measures included in the other alternatives that might provide additional protection against erosion. Despite the lack of specificity, Alternative A would have fewer impacts on water quality than Alternative B, which provides fewer protections against impacts from grazing.

Individual Effects under Alternative B

In addition to the actions under Alternative A, Alternative B would salvage material for growth medium. This action is included in Alternatives C and D also and would indirectly benefit water resources to the extent that it is effective in reducing erosion by helping vegetation cover become reestablished in damaged areas. However, it would discourage application of soil amendments and it would allow multiple land uses while discouraging the use of seasonal closures as a tool for preventing soil compaction. These latter two restrictions on the use of erosion management tools would probably impede reestablishment of vegetation cover in damaged areas. Since closures are one of the most effective means of enabling vegetation cover to become reestablished, Alternative B is expected to have limited success in preventing soil erosion in susceptible areas, thereby reducing the overall indirect benefits to water resources. Under Alternative B, only introduced seed species of grasses and forbs would be used in seeding damaged areas, because they are lower in cost and are more fire resistant. Alternative B allows spring grazing for cheatgrass control on emergency stabilization and burn rehabilitation areas. Alternative B could result in more soil erosion than under the other alternatives because establishment of perennial seeded species would be reduced or eliminated by prescribed grazing.

Individual Effects under Alternative C

Alternative C calls for eliminating or fully mitigating surface disturbances to biological crusts and require reclamation of all surface-disturbing activities, rather than merely pursuing reclamation. Alternative C calls for improving soils by applying natural or organic amendments and for eliminating surface disturbances within areas with high potential for biological crusts. It also calls for implementing seasonal restrictions on use to protect soils from compaction. These measures, especially the use restrictions, are expected to provide greater indirect benefits to water resources than either Alternative A or B.

Individual Effects under Alternative D

Alternative D is similar to Alternative C, except that it requires less stringent measures to avoid disturbance of biological crusts and would make seasonal use restrictions more discretionary than under Alternative C. Alternative D is expected to result in benefits to water resources similar to Alternative C, but by allowing greater discretion to managers to accept trade-offs and use limited funds more strategically.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Alternative A includes no specific action similar to Action WR 2.1 in Alternatives B, C, and D, to protect water resources in watersheds that provide habitat to threatened and endangered species or that function as source areas or recharge areas for municipal water supplies. Current water resources protection in these watersheds is limited to indirect protection afforded by enforcing the Endangered Species Act and by protections afforded by the State of Nevada's wellhead protection program. This program requires that all water suppliers develop emergency or contingency plans detailing the procedures to be followed in the event of water quality or quantity problems (NAC 445A.66665). The wellhead protection program guidelines encourage restriction of sources of pollution within at least 3,000 feet of a wellhead, or the distance that water travels in ten years (NDEP 2004b). Due to their reliance on a distance or travel time criterion, the state guidelines would not necessarily support a prohibition on introducing a pollutant source into a watershed where it could present a longer term threat to municipal water supplies. In this way, the wellhead protection program and the contingency plan program focus on protecting water consumers, rather than on protecting watersheds.

Under Objective 2, Alternative A and Alternative B do not require consideration of the perennial yield of a groundwater basin in projects that involve import or export of water. Under current management, the BLM has no authority to restrict projects involving interbasin water transfers, even if the transfer would exceed remaining sustainable yield of the basin. Since the State Engineer already is charged with preventing water rights from being over appropriated, the effect of this lack of authority should be minor.

Individual Effects under Alternative B

Action B-WR 1.2 would manage priority watersheds for multiple uses. Compared to Alternatives C and D, this could present greater risk of incompatible uses and introduction of pollution sources in these watersheds. Action B-WR 1.5 would manage wellhead protection zones as avoidance zones (as in Alternative D), which is less protective of water resources than under Alternative C.

Objective B-WR 2 encourages private water rights filings for uses on public lands and does not require consideration of source basin perennial yield in management decision making. Action B-WR 2.1. promotes commercial development by allowing water importation and exportation projects. The value of water is increasing, such that there is financial incentive to transfer water rights out of basins in the WDO, to the possible detriment of potential future in-basin demand.

Individual Effects under Alternative C

Action C-WR 1.2 would make priority watersheds exclusion areas for incompatible discretionary actions. This action allows the BLM latitude to restrict activities that present an unacceptable potential for water quality degradation. Similarly, Action B-WR 1.5 calls for managing wellhead protection zones as exclusion zones for discretionary actions.

Alternative C allows importation and exportation of water only if the perennial yield of the source basin is adequate and other (multiple) uses are not compromised. In effect, this means that the BLM would have a tool for rejecting interbasin transfers if the proponent were to demonstrate that the project has a negative impact on basin groundwater storage.

Individual Effects under Alternative D

Under Action D-WR 1.2, priority watersheds would be considered avoidance areas for use incompatible with the priority uses. This is a less stringent limitation than under Alternative C but more protective of water resources than Alternative B. Similarly Action D-WR 1.5 calls for managing wellhead protection zones as avoidance areas. This is the same as Alternative B, but it is less protective than Alternative C.

Action D-WR 2.1 is the same as under Alternative C and is more protective than under Alternative B.

Action D-WR 2.2 specifically calls for developing water sources for fire suppression and storage in 20-foot tanks. This use is not precluded under Alternatives B and C, even though it is not specifically identified. However, under Alternative C, fire suppression activities would be more restricted than under Alternative D.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to all Alternatives

Healthy vegetation cover tends to protect soils from the direct impact of raindrops and slow runoff, which helps to reduce erosion. When runoff is slowed, water has more time to infiltrate the soil and recharge groundwater. Plant litter also softens the impact of raindrops and helps to maintain soil moisture. Plant roots help to stabilize soil and reduce erosion. All of the alternatives promote diverse and healthy woodlands, which would have the indirect effects of maintaining good surface water quality and maximizing groundwater recharge and storage. The alternatives differ in the degree to which these beneficial impacts would be achieved.

Individual Effects under Alternative A

Alternative A allows for use of herbicides to enhance aspen and cottonwood stands. Since these trees are phreatophytes, the use of herbicides may be expected to have potential for impacts on water quality. It also calls for using pesticides to protect harvest areas and chemical treatments to manage designated stands to enhance old growth characteristics, which would introduce potential for impacts on water quality. However, since the chemical treatments would be monitored and chemicals would be selected to have least impact on aquatic species, the impacts are expected to be small.

Fire management under Alternative A is geared toward suppression, which, because it implies maintenance of conditions that may be out of equilibrium with the natural threat of fire, could be unsustainable in the long-term and result in greater loss of vegetation cover in individual fires. Loss of vegetation cover can lead to soil erosion, and larger fires at less frequent intervals might also lead to more soil erosion over a longer period of time, with greater effects on water quality than if the fires are smaller and more frequent.

Alternative A includes prohibitions on harvesting trees within 100 feet of springs and riparian areas in the Stillwater Range and Yellowstone Canyon within the East Range, which would provide some protection to water quality in these areas.

Individual Effects under Alternative B

Alternative B allows harvesting of trees within 100 feet of springs and riparian areas, which would increase potential for impacts on surface water quality from soil erosion. BMPs would be used to ensure that impacts on surface water are mitigated.

Alternative B would use a variety of methods to achieve cottonwood and aspen stand health, including fencing, mechanical and chemical treatments, and planting. The emphasis of Alternative B is on sustainable production of forest products. Alternative B would not designate any acres of old growth forest, which contains a broad mix of species and has not been cut. In general, the emphasis on production of forest products means that there would be periodic cutting and disturbance of soils on the forest floor associated with commercial management of the forest. This disturbance could result in spikes in soil erosion. Production of forest products is sometimes associated with the need to build new roads, which can alter flow patterns, concentrate drainage, and destabilize slopes, leading to potential impacts on water quality from enhanced erosion.

Individual Effects under Alternative C

Alternative C relies on no chemical use and would have least potential for impacts on water resources from these chemicals. They also allow natural fire regimes to replace higher maintenance regimes, which in the long-term may result in fewer and smaller fires and replacement with more rapid-growing species capable of stabilizing the soil.

Alternative C allows the least amount of harvesting and allows for natural replacement of stands, which would probably result in least potential for erosion and therefore fewest impacts on water quality from sediment loading.

Alternative C would designate 27,605 acres of old growth forest as well as other stands if an area exhibits old growth characteristics. Since old growth implies minimal soil erosion and since the old growth would be maintained by allowing natural ecosystem functions to occur, it is likely that this would result in least impact on water quality.

Individual Effects under Alternative D

Alternative D includes the fewest constraints on management and allows the most flexibility for adaptively managing to achieve the conflicting objectives of healthy ecosystem and productive forest. This alternative would allow managers to shift priorities to protect water resources or other resource values instead of adhering to a predetermined plan.

Like Alternative C, Alternative D includes designation of 27,605 acres of old growth forest. Alternative D does not rely on natural fire regimes as under Alternative C but relies on suppression to an extent commensurate with the resource values to be protected. The effects on water quality and quantity are therefore expected to be intermediate between Alternative B and Alternative C.

Effects from Vegetation—Weeds

Effects Common to All Alternatives

Control of invasive and noxious weeds generally would indirectly improve water quality and quantity in areas where impacts have occurred. Noxious weeds tend to out-compete native species and to

have undesirable effects, such as decreasing ground cover, removing soil moisture, or enhancing fire hazard. The actions under Alternatives B, C, and D designed to address objective VW 1 are the same and would have similar impacts on water resources. Alternatives B, C, and D include a number of actions that would not be implemented under No Action.

Individual Effects under Alternative A

As discussed below, Alternative A is expected to have the least positive effect on water resources.

Individual Effects under Alternative B

Alternatives B through D include a number of actions that would not be implemented under the No Action Alternative. To the extent that these actions are successful in reducing the spread of noxious weeds, they may also have beneficial impacts on water resources.

Individual Effects under Alternative C

The effects are the same as those under Alternative B.

Individual Effects under Alternative D

The effects are the same as those under Alternative B.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Actions under Alternatives B, C, and D reflect the fact that chemical and biological pest control methods have advanced greatly since the 1980s in recognition of the need to avoid adverse impacts on water quality and sensitive biota. These advances include development of new products and new methods, such as integrated pest control (IPC), which focuses on addressing the conditions that attract pests and on encouraging natural pest predators, rather than on chemical eradication methods. Chemical pesticides have been developed that have very short half-lives (they degrade rapidly in the environment) and do not bioaccumulate in the food web.

Thus, for example, all of the actions under Alternatives B, C, and D are the same; except Actions 1.1 and 1.4, and all are directed toward ensuring that appropriate pest control methods will be used, relying as little as possible on chemical pesticides.

Individual Effects under Alternative A

Alternative A does not include many of the specific actions that are included in Alternatives B, C, and D, such as actions associated with various aspects of an IPC program since IPC was not widely established at the time the previous RMP was developed. This does not mean that IPC would not be implemented under No Action but rather that the current plan does not specifically identify these actions. Current practice does include many of the actions identified under Alternatives B, C, and D, such as employing BMPs. However, if not specified in the RMP, some actions that may ultimately be protective of water resources, such as educational programs and seeking out new techniques, may not be implemented if they require expenditures. Therefore, it is expected that Alternative A would be somewhat less effective in reducing impacts on water resources than Alternatives B, C, and D.

Individual Effects under Alternative B

Action B-PE 1.1 would select pest control methods from among the approved methods available, based on cost/benefit analysis. Since the emphasis is on cost, and "benefit" is not well defined, pesticides that cost less or are not as effective would tend to be used even if they were to result in the greatest risks to water quality. Therefore, Alternative B is expected to have the greatest impacts on water quality among Alternatives B, C, and D.

Action B-PE 1.4 is more likely to result in adverse impacts on water quality than Alternative C because it includes chemical pest control, while Alternative C does not. The impacts are the same as those for Alternative D.

Individual Effects under Alternative C

Alternative C differs from Alternatives B and D in that it would minimize chemical pesticide use as a matter of policy and would rely primarily on mechanical, cultural, and biological control methods. Therefore, Alternative C is expected to have the least impact on water quality. However, if Alternative C is not effective, there may be some pressure to revise the strictures of Alternative C to allow chemical pest control in the future. Similarly, if lack of effectiveness of nonchemical weed control methods leads to greater risk of fire or increased erosion, the impacts on water resources from the increase fire risk may be greater than the benefits achieved by not using chemical pest control.

Individual Effects under Alternative D

The effects on water resources are expected to be intermediate between Alternatives B and C, mainly because under Action D-PE 1.1, Alternative D does not rely on cost effectiveness as the sole criterion for selecting pesticides and does not exclude the use of chemical pesticides.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

The effects of most of the rangeland management actions on water resources are expected to be beneficial, since achieving the principal goal of maintaining and improving healthy vegetative communities would also tend to result in minimizing soil erosion, retaining water, and avoiding or reversing the adverse effects on vegetation and soils largely caused by grazing animals or fire. The alternatives differ mainly in the degree to which these benefits would be achieved.

Individual Effects under Alternative A

Alternative A allows for chemical treatments, which could result in impacts on water quality, and prescriptive grazing, which may result in increased erosion and sediment loading. Although some types of management actions included in Alternatives B, C, and D are not specifically included in Alternative A, most of the management actions proposed under Alternatives B, C, or D (except Option 2 of Alternative C) are currently implementable under Alternative A, and current management most resembles Alternative D. Among rangeland environments, sagebrush scrub is perhaps the most important to water resources because it occurs on higher elevations with greater slopes, where perennial streams are more likely to be found, than in salt desert scrub. Among the

most critical issues in sagebrush scrub is the increased potential for fire caused by spread of cheatgrass. Actions that successfully reduce or reverse the spread of cheatgrass will indirectly benefit water resources by reducing fire hazard. Management actions under Alternative A are less proactive than under Alternative D, as indicated by Action A-VR 7.2, and rely more on fire suppression (A-VR 6.3, 6.4). These methods have been largely unsuccessful in arresting the spread of cheatgrass, and therefore indirect impacts on water resources from wildland fire are expected to increase under Alternative A.

Individual Effects under Alternative B

Alternative B focuses on maintaining rangeland for livestock grazing. For example, Action B-VR 1.3 calls for reseeding with forage grasses rather than on restoring native grasses that may be better adapted to natural rangeland conditions; Action B-VR 4.1 calls for seeding disturbed areas with grasses and forbs, rather than with a more natural and wider range that includes shrubs (as under Alternative D).

Alternative B also calls for a shorter rest (from grazing) of burned areas than do Alternatives C or D and does not wait for monitoring objectives established in emergency stabilization or burned area rehabilitation plans to be achieved, as under Alternatives A and D.

Action B-VR 5.1 calls only for seeding with introduced species in areas "lacking potential for natural recovery," and Action B-VR 5.2 would not establish vegetation release criteria. Overall, this emphasis on grazing use and less effort and funds to reestablish native vegetation than the other alternatives is expected to continue to result in indirect adverse impacts on water resources from erosion and sediment loading.

Individual Effects under Alternative C

Alternative C does not allow chemical treatments and does not include prescriptive grazing. Therefore, it is expected to have the least potential for direct adverse impacts on surface water quality, although the ultimate impacts on water resources would also depend on relative success of these methods in restoring rangeland vegetation.

Option 2 of Alternative C does not include grazing. This option is expected to have the greatest benefits to water resources since grazing is currently one of the activities that has the most impact on water resources in the WDO.

Option 1 would limit prescriptive grazing more than the other alternatives by requiring that "best science shows a reasonable chance of success" in achieving reduced biomass production and restoring decadent plant vigor. Since there would be less grazing under Option 1, this is expected to result in more benefits to water resources than the other alternatives.

Actions C-VR 1.3, C-VR 4.1, and C-VR 5.1 call for greater reliance on seeding with native species than the other alternatives. In some cases, this may severely limit implementability and increase cost of reseeding, where native seeds are in short supply. This may delay reseeding, leading to potential adverse impacts on water resources because of continued erosion hazard or allow greater opportunity for noxious or invasive plant species (such as cheatgrass) to gain a foothold.

Individual Effects under Alternative D

Alternative D allows more flexibility to land managers in the choice of methods for restoring rangeland health than does Alternative C. For example, it would allow reseeding with nonnative species where appropriate and seeding with species that have the greatest potential to resist wildland fire could be used. Alternative D allows grazing but puts a higher priority on restoring natural range conditions than does Alternative B. As a result, impacts on water resources are expected to be least under Alternative D.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

The objectives (VRW 1) of each of the alternatives differ regarding amount of riparian and wetland areas to be in proper functioning condition (PFC) by 2028. Currently, 48 percent of the lotic (stream) and lentic (wetland) areas are functioning at risk with an improving trend. Alternative A calls for all riparian areas to be progressing toward PFC. Under Alternative B the objective is for 60 percent to be in PFC by 2028, under Alternative C it is 85 percent, and under Alternative D to be progressing toward PFC. Therefore, even if the management actions are the same, (for example, Action VRW 1.3, which addresses non-livestock grazing impacts on riparian areas is the same for Alternatives B, C [Option 1], and D), the intended outcome under each of the alternatives would be different.

Grazing has historically been one of the principal causes of damage to riparian areas and of water-related impacts, and accounts for most of the non-PFC riparian areas. Therefore, Option 2 is expected to result in the greatest improvements in water resources. Damage to riparian areas is not a function of numbers of animals since relatively few animals can cause substantial damage. Instead, most damage results from repeated use during the hot season (July through September), when animals concentrate in riparian areas. Most impacts on water resources occur at mid- to higher elevations, where perennial surface water is more abundant. Therefore, avoidance of these sensitive areas during the hot season may be the most effective means of restoring and maintaining PFC and reducing impacts on water resources.

Individual Effects under Alternative A

Management Action A-VRW 1.1 calls for improving riparian areas by determining causal factors, developing strategies, and coordinating with the public. However, in the years since this management action was formulated, many of the causal factors have become much better understood, and strategies have been developed to address them, which are described in Alternatives B, C, and D. This points out one of the weaknesses of Alternative A: that it is somewhat anachronistic and does not reflect current knowledge.

Alternative A relies heavily on engineering controls, as indicated in Action A-VRW 1.2, such as development of structures, alternative water developments, and exclusion fencing. Experience has shown that maintaining these controls is difficult and not always successful. Lack of successful maintenance of engineering controls can result in impacts on water resources.

Individual Effects under Alternative B

Management actions under Alternative B are generally the same as those under Alternative A because Alternative B represents the status quo with respect to livestock grazing. For example, Alternative B relies on engineering controls to prevent livestock from concentrating in riparian areas, rather than reducing livestock use of these areas. The principal difference between Alternative A and Alternative B is that Alternative B sets the moderate objective of achieving 60 percent PFC in 20 years, an increase of 12 percent over current conditions. PFC tends to be associated with high water quality, especially with respect to sediment loading, pathogens, and nutrients. It also tends to be coupled with good water retention and storage in the watershed. Therefore, an improvement in PFC is expected to be coupled with an improvement in water quality.

Individual Effects under Alternative C

Alternative C sets the most challenging objective: to achieve 85 percent PFC in 20 years, nearly double the current area in PFC. Alternative C would achieve this objective through eliminating grazing (Option 2) or implementing grazing management objectives, reducing grazing, and adjusting season of use, duration, AMLs, or AUMs (Option 1). If the objectives for PFC are achieved, beneficial impacts on water resources would be greatest under Alternative C. Since the 85 percent PFC objective applies to both options 1 and 2, it is more likely that the objective would be achieved under Option 2 than Option 1.

Individual Effects under Alternative D

Alternative D sets a goal of progressing toward PFC in 20 years, which is essentially the same as under Alternative A. Like Alternative C (Option 1), Alternative D would include seasonal adjustment of grazing use, adjustment of duration, and adjustment of AMLs or AUMs, rather than relying entirely on maintenance of engineering controls. Given the similarity of management actions, particularly with respect to livestock grazing, between Alternatives C (Option 1) and Alternative D, the lower objective for increase in PFC under Alternative D is more achievable.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Each of the alternatives contains actions intended to improve wildlife habitat and protect riparian habitat. Measures that limit uses in order to benefit fish and wildlife (particularly fish) also have the potential to indirectly improve water quality and increase water retention in watersheds.

Management actions that are the same or similar under all alternatives include CA-FW 1.1, CA-FW 2.1, and FW 9.2. Management actions that would have the same or very similar effects on water resources under Alternatives B, C, and D include FW 2.1, FW 2.2, FW 5.1, FW 7.1, FW 8.1, and FW 9.2. Additionally, some of the management actions would have negligible or no effect on water resources, including (in addition to those listed above), the actions under Objective FW 6.

Individual Effects under Alternative A

As discussed elsewhere, current management actions were developed when there were fewer quantitative data and less understanding of the effects of management decisions. Therefore,

management actions tend to be broader and less specific under Alternative A than under the other alternatives. This does not mean that more specific actions could not be implemented under Alternative A, but since many actions require commitment of time and financial resources, there is much less assurance that such actions would be implemented under Alternative A.

Potential minor adverse impacts on water quality could result from increased populations of big game animals such as elk and deer since these animals contribute to similar impacts caused by livestock grazing (trampling riparian areas, compacting soils, being a source of waterborne pathogens). Alternative A could result in an increase in use by hunters, as a result of increased numbers of game animals, with potential indirect adverse effects on water resources associated with OHV use, increased fire danger, and pathogen loading associated with human use.

Alternative A allows for use of chemical treatments to improve wildlife habitat, which could result in impacts on surface water quality, as described under rangeland management.

Action A-FW 9.1 calls for implementation of engineered improvements, such as instream structures and fish barriers to improve aquatic habitat. Such measures have historically had a low rate of success and sometimes lead to additional riparian problems, for example if the structure needs to be removed or is damaged by high flows.

Action A-FW 10.1 calls for water barring access roads to specific streams. This engineering method of reducing erosion impacts of roads in steep narrow canyons has not been entirely successful.

Individual Effects under Alternative B

Alternative B would designate the fewest acres for restricted use to protect wildlife. It would designate 716,528 acres as priority 2 wildlife habitat (avoidance areas). This designation would result in some indirect beneficial effects on water since activities that could impact water quality or impact riparian habitat might be restricted.

Management Action B-FW 1.5 would have the opposite effect since it would not allow introductions of wildlife whose habitat requirements would interfere with other multiple uses. Since those multiple uses would include potential pollutant-generating or soil-disturbing activities, this action would reduce restrictions on land use that could indirectly protect water resources.

Actions under Objective B-FW 3 may have indirect positive impacts on water resources by protecting aquatic bird habitat. Alternative B, however, provides the least protection since it would not preclude multiple uses.

Action B-FW 8.2 would not allow fencing to keep livestock from reservoirs that support fisheries. There are five reservoirs of this description in the WDO, and they are grouped together in this analysis because the existence of a fishery is an indicator of relatively good water quality and potential for recreational use. Livestock use of reservoirs would have potentially adverse impacts on water quality in this group of reservoirs.

Action B-FW 8.3 calls for not having a minimum pool requirement on new irrigation reservoirs. The minimum pool would help to prevent development of anoxic conditions as water levels decline during the hot season. However, maintaining a minimum pool would require use of water rights allocated by the state to a private entity, and imposing a requirement to maintain minimum pool may

be construed as a taking of property. Alternative B avoids this potential legal issue but would continue the status quo, which is to allow anoxic conditions to develop.

Alternative B allows for chemical treatments to restore or improve wildlife habitat. Chemical treatments carry some risk of adversely impacting water quality. These would be mitigated through BMPs.

Action B-FW 9.1 calls for improving aquatic habitat by emphasizing restoration of natural processes. Related to this, Action B-FW 9.3.1 calls for improving stream bank and shoreline stability by limiting stream bank alteration to 20 percent or less of linear bank length on fishery waters. These actions are the same as under Alternative D and would have beneficial impacts on water resources intermediate between Alternatives A and C.

Action B-FW 10.1 allows several options (maintain, alter, or remove) for addressing the erosion impacts from access roads on streams and gives priority to routes affecting fishery resources. This action is less extreme than Alternative C, which calls for removing access routes that adversely impact aquatic resources. The short-term impacts on water quality of removing a road could result in water contamination since the exposed soil on the altered road cut would be vulnerable to erosion.

Individual Effects under Alternative C

Benefits would be greatest under Alternative C, which designates almost 1.3 million acres as priority 1 wildlife habitat (exclusion areas closed to fluid mineral development), and about 0.9 million acres as priority 2 wildlife habitat (avoidance areas). Alternative C also limits annual stream bank alterations to less than 10 percent of linear bank length, which would be half of the allowable annual stream bank alterations allowed under Alternatives B and D. These restrictions would reduce the potential for pollutant-generating activities to be introduced into the watersheds of these areas.

Action C-FW 3.2 would protect shorebird habitat and could limit some conflicting uses, resulting in indirect beneficial impacts on water quality. And Action C-FW 4.1 would prohibit some uses of migratory bird nesting areas during the wet season when potential for damage to soils from compaction is greatest. Soil compaction can lead to adverse impacts on water quality because it can reduce infiltration and increase runoff and may lead to loss of vegetation and consequent increased soil erosion.

Alternative C prioritizes nonchemical methods for improving habitat and places the least reliance on active management measures. Alternative C would allow introduction of native wildlife species into historical habitat areas, even though this may result in the need to restrict other uses in such areas (for example, increased ruffed grouse habitat might result in expansion of areas subject to mineral stipulations).

Action C-FW 8.2 calls for fencing to keep livestock from reservoirs that support fisheries. If effective, this would result in a beneficial impact on water quality in the reservoir and inlet or outlet streams.

Action C-FW 8.3 would require maintaining a minimum pool on new irrigation reservoirs. As discussed under Alternative B, the minimum pool would help to prevent development of anoxic

conditions as water levels decline during the hot season. However, maintaining a minimum pool would require use of water rights allocated by the state to a private entity, which could be construed as a taking of property. Alternative C would test this potential legal issue but might avoid the adverse water quality impacts associated with anoxic conditions, including odors, organism die-off, and possible chemical changes favoring increased solubility of heavy metals.

Alternative C would prohibit construction of artificial water developments, such as guzzlers, for wildlife use, and it would limit use of OHVs in certain areas, such as Gridley and Continental Lakes, for protection of shorebird habitat. The combined impacts on water resources of these measures would be beneficial on water quality to the extent that they limit uses that could have adverse impacts on water quality (for example, OHV use can lead to enhanced soil erosion, and guzzlers can encourage congregation of grazing animals, leading to consequent soil compaction).

Action C-FW 9.1 calls for restoring natural processes to improve aquatic habitat. Action C-FW 9.3.1 calls for improving stream bank and shoreline stability by limiting stream bank alteration to 10 percent or less of linear bank length on fishery waters, and Action C-FW 9.3.2 calls for limiting annual stream bank alteration impacts on five percent or less of linear bank length in sensitive channel types. Although they are intended to have greater beneficial impacts on water resources than the corresponding actions under Alternatives B and D, it should be noted that natural alteration may be greater than the 10 percent or 5 percent goals, and the intention of the management action is to encourage restoration of natural function rather than to achieve numerical goals. Similarly, relying entirely on natural processes may result in greater adverse impacts in the short term if current conditions are far from the natural range of conditions.

Action C-FW 10.1 calls for removing (rather than repairing or altering) access roads in steep canyons that are adversely impacting aquatic resources. The short-term impacts on water resources of removing a road could result in water contamination, but in the long term the impacts on water resources are expected to be beneficial, both because the road would not longer contribute to enhanced erosion and because removing the road would limit access to the stream and reduce the potential impacts associated with human use.

Individual Effects under Alternative D

Alternative D designates 699,929 acres as priority 1 wildlife habitat for sage-grouse and sagebrush obligate species and more than 1.3 million acres as priority 2 wildlife habitat (avoidance areas). This would result in indirect beneficial impacts on water resources intermediate between Alternatives B and C. As under Alternative C, Action D-FW 1.5 would allow introduction of wildlife into new areas, which may increase the protected habitat area. Unlike Alternative C, Alternative D would allow introduction of nonnative species if they do not displace native species.

Similar to Alternative C, Action D-FW 4.1 would provide use restrictions to protect migratory bird nesting areas during the nesting season, which corresponds to the last part of the wet season. Alternative D would require a pre-disturbance inventory to determine if nests are present.

Similar to Alternative C, Action D-FW 8.2 calls for fencing all reservoirs supporting fisheries, if practicable.

Effects from Special Status Species Management

Effects Common to All Alternatives

Each of the alternatives includes actions that would limit or prohibit incompatible uses of sensitive habitat. Such use limitations would have the potential to also limit uses that might lead to degradation of water quality. The alternatives differ primarily in the degree of limitation. The impacts on water resources would be indirectly beneficial.

Action SSS 1.3 would restrict uses in sensitive species habitat, although the nature of the restriction would be determined on a case-specific basis and might vary by alternative. For example, Alternative B generally calls for the fewest use restrictions, and Alternative C generally calls for the most, so implementation of Action SSS 1.3 might reflect these differences.

Individual Effects under Alternative A

As noted elsewhere, management actions under Alternative A are generally not as specific as under the other alternatives, and they were formulated when the knowledge base was less sophisticated than it is now. This appears to allow more opportunity for discretionary actions, but in practice it may lead to inaction because funding or policy direction are lacking.

Individual Effects under Alternative B

Alternative B tends to rely on mitigation to offset impacts on sensitive species and habitat, rather than proactive measures to avoid impacts. Mitigation may or may not be effective or beneficial to water resources.

Alternative B would manage existing LCT habitat without seeking expansion of LCT range. Designation as LCT habitat would confer additional protection on those water bodies so designated, so Alternative B would be less protective in comparison to the other alternatives.

Action B-SSS 1.1 does not specify a two-mile inventory zone around sensitive plant occurrences, as under No Action and the other alternatives. It allows for a variety of mitigation measures, including buffers of unspecified size. This is less restrictive of incompatible uses than the other alternatives and could result in greater potential for adverse impacts on water resources. Similarly, sage-grouse habitat does not receive any standard protection under Alternative B but would be evaluated by an interdisciplinary team on a case-by-case basis.

Action B-SSS 1.5, which allows prescriptive grazing on a case-by-cases basis in wet meadows and riparian areas that have been closed to grazing, could have adverse impacts on water resources. However, such impacts would be carefully planned and monitored to balance the benefits with the potential impacts.

Individual Effects under Alternative C

Alternative C is likely to have the greatest benefit to water quality because it limits human activities in larger areas and for longer periods than the other alternatives.

Action C-SSS 1.2 includes specific guidelines for sage-grouse habitat, including prohibiting all surface disturbance or occupancy within two miles of leks, or within known nesting, summer, or

winter habitats. Action C-SSS 1.2.3 also prohibits high profile structures within two miles of an active sage-grouse lek.

Alternative C is also more restrictive of surface uses near bat habitat, setting a 500-yard distance limit rather than 200 yards as in other alternatives. This small difference would likely have little impact on water resources, although fewer surface-disturbing uses would generally reduce the potential for water resource impacts.

Alternative C would encourage expansion of LCT populations into new waters or waterways, potentially increasing water quality protection in those waters.

Individual Effects under Alternative D

The effects of Alternative D on water resources are intermediate between those under Alternatives B and C. Alternative D tends to be more closely similar to Alternative B in the use of mitigation. Action D-SSS 2.2 is the same as Alternative A regarding expansion or augmentation of LCT habitat and calls for cooperation with NDOW and USFWS rather than independent management of this habitat. One aspect of expansion of LCT habitat is the potential use of rotenone, a biocide that could be used to eliminate competing fish from waters into which LCT are introduced.

Action D-SSS 1.5, which allows prescriptive grazing on a case-by-cases basis in wet meadows and riparian areas that have been closed to grazing, could have adverse impacts on water resources. However, such impacts would be carefully planned and monitored to balance the benefits with the potential impacts.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

WHB cause adverse impacts on water quality when the animals congregate near surface water, overgraze sensitive areas, spread plant pests, increase pathogen loading to water bodies via surface water contact with manure, and compact or otherwise damage soil. Unlike livestock, which can be moved to other areas when impacts are observed, movements of WHB are not controlled because maintaining the free-roaming nature of WHB is an objective of all of the alternatives (though Alternative B makes it a secondary objective). WHB tend to stay in the same watering areas all year, and this does not allow damaged areas to rest and recover.

Historical observation indicates that water resources impacts are highest in areas with a moderate abundance of water and higher variability in abundance from year to year, because animal numbers increase during good years and cannot be supported during low water years. Areas with relatively abundant sources of water experience few impacts. Areas that are consistently dry and have relatively few sources of water experience few impacts because these areas do not support significant WHB populations.

The most effective measures for reducing impacts on water resources are controlling populations and preventing WHB from using damaged or sensitive areas during low water periods. Each of the alternatives includes the objective of ensuring unencumbered access to water by WHB and of maintaining WHB populations, but each presents different approaches to implementing these objectives.

Individual Effects under Alternative A

Alternative A is protective of water quality to the extent that it would limit WHB to existing HMAs and HAs. However, the objective of managing and protecting WHB on lands where they occurred in 1971 might lead to adverse effects where the 1971 lands do not have adequate water resources to support WHB. The 1971 range criterion was based on the areas inhabited by WHB at the time the WHB Act of 1971 was passed, and this criterion prioritizes the objective of restoring WBH to their recent historical range. This is the case whether or not this range is appropriate for protecting water and other resources. This objective is abandoned in the other alternatives, except that management Action C-WHB 1.3 also looks to conditions in 1971 as a guide to current management.

Management Action A-WHB 1.5 calls for maintaining established AMLs as a population range rather than a single number, in recognition of how populations tend to fluctuate. This gives managers greater discretion to take fluctuations in environmental conditions into account when estimating AMLs. In contrast, Alternative B would use a single AML number.

Actions A-WHB 1.6, and A-WHB 1.7 call for gathering WHB on minimum four-year cycles, to AMLs (predetermined through the FMUD process), while controlling population growth rates with fertility control inhibitors. Since the most severe impacts on water resources tend to occur at the upper end of the AML range, maintaining lower populations for longer periods would help reduce impacts on water resources. Much depends on what the AMLs actually are, and Alternative A is a relatively unbiased method of determining AMLs using available data.

Individual Effects under Alternative B

Alternative B would avoid potential adverse effects on water resources that might occur under Alternative A by limiting WHB to lands that can support them.

Action B-WHB 1.8 calls for adjusting AMLs with emphasis on multiuse needs. Action B-WHB 1.10 provides further insight on how the multiuse needs analysis would emphasize livestock grazing over WHB grazing. When forage is low, Action B-WHB 1.10 calls for preferentially removing WHB over livestock. Since more control of seasonal use of ranges can be exercised over livestock than WHB, the emphasis on reducing WHB may lead to more effective water resource management under Alternative B.

Alternatives B and D specify gathering to the low AML when numbers exceed the upper AML. As with Alternative A, a four-year minimum gather cycle would be maintained. The impacts of these actions on water resources would be similar to Alternative A.

Individual Effects under Alternative C

WHB populations are likely to expand faster under Alternative C than other alternatives. Since WHB tend to remain in watering areas all year, impacts from increased use of ranges by WHB may result in greater impacts on water resources under Alternative C than under the other alternatives. Alternative C limits management tools (such as fertility control measures, fences, and more frequent gathers) that might be used to protect water resources, and this may also result in adverse impacts on water quality. Option 1 would remove livestock when rangeland indicators show adverse impacts, and Option 2 eliminates livestock grazing altogether.

Alternative C specifies adjusting AML to maintain healthy threatened and endangered species habitat in priority watersheds. Although this would affect only a small portion of the total herd areas and herd management areas, it is expected to result in a beneficial impact on water quality in those priority watersheds.

Individual Effects under Alternative D

Alternative D emphasizes reduction of impacts on rangeland by grazing animals, rather than emphasizing either livestock use or use by WHB. Actions D-WHB 1.5, D-WHB 1.6, and D-WHB 1.7, which have to do with controlling herd sizes, are the same as under Alternative B. Action D-WHB 1.8 calls for reevaluating AML to ensure they are consistent with the thriving natural ecological balance (TNEB) of the specific habitat and with other multiple uses. This action differs from Alternative B in the requirement to be consistent with TNEB. Further, Action D-WHB 1.8.1 calls for setting AML to zero and removing animals from areas that do not provide adequate suitable habitat to support healthy self-sustaining populations of WHB. The emphasis on TNEB, and its application to all HMAs instead of just to priority watersheds, (unlike in Alternative C), and the ability to set AMLs to zero if appropriate, is expected to result in beneficial impacts on water resources.

Effects from Wildland Fire Management

Effects Common to all Alternatives

Fire removes vegetation cover and exposes soils to erosion. Combustion can create a variety of toxic chemicals that may eventually be transported to water bodies in runoff or because of atmospheric deposition. Fires reduce the ability of watersheds to retain runoff and may have an impact on groundwater storage. Minimizing fires is expected to have a positive impact on water resources.

Fire suppression itself can result in soil disturbance if vehicles and equipment are used to fight the fire on the ground. Use of fire retardants may impact water quality directly. Different chemical retardants are used for fighting fires on the ground and from the air. Retardants used on the ground tend to contain surfactants (detergents) to allow greater penetration of the water into bark and wood, but the surfactants can impact fish and other aquatic animals. The effects are small, due to the relatively short half-life of the surfactants. Fire suppression methods and equipment are tailored to the environments in which they are used, taking into account the sensitivity of those environments. Under each alternative, the response to wildfires based on social, legal and ecological consequences of the fire would be developed within each FMU. Therefore, the impacts of fire suppression techniques are expected to be small compared to the impacts of the fire itself.

Many of the management actions are similar, and impacts on water resources are expected to be similar. Differences are summarized below.

Individual Effects under Alternative A

The BLM would continue to use management tools, such as prescribed fire and vegetation manipulation (mechanical, biological, and chemical treatments), to construct fuel breaks or green strips. There would be no new impacts. Chemical treatments could contaminate water bodies.

Individual Effects under Alternative B

Alternative B designates 110,167 acres as suitable for wildfire use and would allow prescribed burns to achieve vegetation management objectives. Alternative B represents the upper extreme in use of fire as a vegetation management tool. The impacts of prescribed fire or allowing fire for resource benefit on water resources are expected to be minor since they would be conducted under controlled conditions on small areas.

Individual Effects under Alternative C

Alternative C would not allow prescribed fire as a tool for fuel reduction. Eliminating prescribed fire as a tool for vegetation management could have short-term beneficial impacts on water quality but may have adverse impacts on water in the longer term if severe fires occur that could have been prevented earlier by fire treatments. The BLM would not use chemical treatments, which would reduce the possibility of contaminating water bodies.

Individual Effects under Alternative D

Alternative D is similar to Alternative B, and the impacts on water resources are similar to those described above.

Alternative D allows prescribed fire and fire for resource benefit for 9,932 acres. Therefore, the impacts on water resources are expected to be intermediate between Alternatives B and C.

Effects from Cultural Resources Management

Effects Common to Alternatives

Each of the alternatives could indirectly and beneficially impact water quality and might reduce water consumption in some areas. This would take place to the extent that project actions would require avoidance of or exclusion from some or all uses in areas with cultural value, for example, occupancy of mineral lands might be restricted due to presence of cultural resources. To the extent that many cultural sites may be located near water resources, these beneficial impacts might be cumulatively important.

Individual Effects under Alternative A

Most of the WDO would remain open to OHV use under management Action A-CR 1.2. OHV use has the potential to increase soil erosion and thus to adversely impact receiving waters, by disturbing soil, creating ruts that become conductors of runoff, and compacting moist soils.

Individual Effects under Alternative B

Action B-CR 1.2 and its impacts on water resources are the same as those for Alternative A.

Individual Effects under Alternative C

Action C-CR 1.2 would limit OHV use in culturally sensitive areas. This would indirectly benefit water quality by reducing the potential for soil erosion and sediment loading.

Individual Effects under Alternative D

Action D-CR 1.2 is the same as that under Alternative C, and the effects on water resources are the same.

Effects from Tribal Consultation

Effects Common to all Alternatives

The impacts of tribal consultation are not predictable. It is possible that more water resources would be protected if sensitive culturally significant areas are given restricted access status. Alternatives A, C, and D would result in similar indirect beneficial impacts on water resources from restricted access and avoidance of culturally sensitive sites.

Individual Effects under Alternative A

Avoidance of sacred sites and restricted use of, or exclusion from, other culturally sensitive sites would protect water resources in the vicinity of these restricted areas by reducing the potential for sources of pollution to be introduced. The impacts are expected to be the same for all of the alternatives.

Individual Effects under Alternative B

The effects are the same as those under Alternative A.

Individual Effects under Alternative C

The effects are the same as those under Alternative A.

Individual Effects under Alternative D

The effects are the same as those under Alternative A.

Effects from Paleontological Resources Management

Effects Common to all Alternatives

All of the alternatives might result in indirect beneficial impacts on water quality if human activities are restricted from lands containing important paleontological resources. The types of activities that might be restricted could be moderately destructive to water quality, such as OHV use and mineral extraction. Grazing and recreation, which can have adverse impacts on water quality, probably would not be restricted to protect paleontological resources.

Individual Effects under Alternative A

Objective A-PR 1 calls for developing stipulations, use restrictions, and mitigation measures as necessary to avoid or reduce adverse impacts on lands identified as having significant paleontological resources. This would result in beneficial impacts on water resources to the extent that it restricts activities that could introduce pollutants. Some of the actions identified in the other alternatives do not have counterparts in Alternative A, but this would not significantly change the effects on water resources.

Individual Effects under Alternative B

The effects are the same as those under Alternative A.

Individual Effects under Alternative C

The effects are the same as those under Alternative A.

Individual Effects under Alternative D

The effects are the same as those under Alternative A.

Effects from Visual Resources Management

Effects Common to all Alternatives

Visual resource management actions are not expected to impact water resources since visual resource classification would not restrict uses but would only require that they conform to visual aesthetic guidelines.

Individual Effects under Alternative A

No impacts on water resources are expected.

Individual Effects under Alternative B

No impacts on water resources are expected.

Individual Effects under Alternative C

No impacts on water resources are expected.

Individual Effects under Alternative D

No impacts on water resources are expected.

Effects from Cave and Karst Resource Management

Effects Common to all Alternatives

Karst refers to a geological terrain, which may underlie a wide area. Many karst features are found below the ground surface, and caves are just one of the more spectacular features associated with karst terrain. Cave and karst features would be inventoried under Alternatives B, C, and D, and the inventory process would identify and prioritize the specific features requiring protection. Not all caves in karst terrain are associated with existing flowing water, but protecting karst features may directly protect some waters that flow through karst. Some surface manifestations of karst terrain, such as sinkholes, make convenient dump sites that may also be conduits to groundwater. Furthermore, groundwater can flow rapidly through cavernous limestone and carry pollutants long distances. Therefore, public awareness of karst and of these hazards to water resources may lead to lower potential for these impacts on water quality. Education about caves and karst, which is common to all alternatives except Alternative A, could also increase public awareness and sensitivity about other fragile natural systems, like streams and high quality watersheds.

Individual Effects under Alternative A

No management actions are identified, so cave and karst resources would receive no specific protection. Water resources associated with these resources would have the same protections as they do in other environments without cave and karst resources, including protections related to cultural resources or paleological resources that may be present in cave and karst terrain.

Individual Effects under Alternative B

Alternative B would treat cave and karst features in much the same way that other unique geological features would be protected. Use restrictions, including seasonal closures and avoidance would help to reduce the potential for adverse impacts on water resources in the vicinity of cave and karst features.

Individual Effects under Alternative C

Alternative C would not allow surface-disturbing activities within 500 feet of natural caves.

Individual Effects under Alternative D

Management actions under Alternative D are the same as those under Alternative B, so effects on water resources are expected to be about the same as those under Alternative B.

Effects Common to all Alternatives from Livestock Grazing Management

Effects Common to all Alternatives

Livestock grazing under all of the alternatives (with the exception of Option 2 of Alternative C, which would eliminate livestock grazing) is expected to continue to have impacts on water resources, especially on surface water quality.

Potential impacts of grazing include sediment loading from soil eroded by wind and water. Grazing may cause vegetation loss, soil compaction, reduced runoff retention, riparian function loss, biological crust loss, direct soil disturbance, and runoff concentrated into animal trails, with consequent enhanced erosion. Grazing animals can alter vegetation communities, spread undesirable species, alter natural succession patterns, and potentially create conditions more susceptible to erosion.

Grazing animals tend to congregate in riparian areas, such as accessible stream crossings, springs, shady level areas, or other small areas that may not be able to support large numbers of animals, independent of the adequacy of forage available within the grazing allotment. Therefore, forage adequacy, which is an indicator of the number of animals that can be sustained on a given allotment, may not account for concentrated impacts in riparian areas.

Grazing animals create waste that can introduce nutrients and pathogens to streams directly or in runoff. Excessive nutrient loading can lead to algal growth, depleted dissolved oxygen needed to support aquatic fauna, reduced water clarity and consequent increased water temperature, and other effects that reduce riparian function.

Under each of the alternatives (except Option 2 of Alternative C), 399,073 AUMs of livestock forage would be allocated, subject to adjustment based on monitoring (and on other criteria in the case of Alternative C [Option 1]).

The effects of grazing occur at very low animal densities, vary over a wide spectrum, temporally and spatially and with slope, soil, climate, and vegetation. Relatively low effects tend to be considered acceptable, and both subjective and objective criteria are used to evaluate them. These include estimates of sustainability (proper functioning condition of riparian habitat), trend analysis, and comparison to numerical standards (such as fecal coliforms and nitrate concentrations). In most areas, knowledge about the resilience of receiving waters is lacking because long-term studies have not yet been undertaken. In other areas, such as on stream segments or watersheds where TMDLs have been developed, a relatively high degree of knowledge is available. Water quality standards have not been set on many smaller streams. The Nevada tributary rule requires that tributaries should not contain waters of lower quality than the downstream segment. Most of the streams in the WDO are tributary to the Lower Humboldt River, which is much lower in quality than the streams higher in the watershed.

Because of the difficulties involved in quantifying and evaluating effects, some effects may not be recognized in a timely fashion or the causes may not be correctly diagnosed until damage has occurred. Thus, management entails risks of failure to meet objectives, and those risks are greater in sensitive or fragile environments. In recognition of the inherent difficulties in identifying and diagnosing effects, all of the alternatives rely to some degree on adaptive management, allowing managers to apply mitigation measures appropriate to specific conditions.

Individual Effects under Alternative A

The objectives of each alternative differ in their emphasis on livestock grazing, and so the management actions designed to achieve the objectives also differ in the degree of impact they would have on water resources.

Alternative A attempts to strike a balance between livestock grazing and other uses, minimizing conflicts between livestock and other uses. Alternative A is the baseline against which the effects of other alternatives can be compared. Under Alternative A, about 38 percent of lotic riparian habitat is functioning at PFC, and about 23 percent of lentic habitat is at PFC. About 17 percent of lotic habitat is classified as improving, and about 11 percent is getting worse; about 4 percent of lentic habitat is improving, and about 15 percent is getting worse (see Chapter 3.2.4). Since PFC is an indicator of the state of surface water resources, these figures suggest that under current management, slow progress is being made toward improving stream water quality, while the reverse is true of water quality in wetland areas. One of the primary causes of this slow progress is management of livestock grazing, and a key component is hot season grazing.

Closure to grazing is one of the most effective methods of preventing adverse effects on water resources. Alternative A does not close any acreage to livestock grazing, while Alternative B closes 293,447 acres, about 3,000 acres fewer than Alternative C Option 1 and about 20,000 acres fewer than Alternative D. Therefore, Alternatives A and B would result in more of the types of impacts on water quality described above than would Alternatives C and D.

Alternative A provides guidance on criteria for issuing grazing permits and relies on post-permit adaptive management to mitigate adverse impacts. This would result in higher risks to water resources but would not necessarily result in adverse impacts if managers had adequate information and tools to anticipate and correct adverse effects.

Alternatives A and B, and to a lesser extent Alternative D, allow continued development of new springs and wetland-riparian areas for livestock watering with constraints. The development of these new watering sources would allow animals to be rotated among a larger number of sites and would allow more opportunity for disturbed sites to rest and recover.

Alternatives A and B allow TNR on a case-by-case basis, without specifying criteria under which use of TNR would be evaluated. These criteria would likely include the same criteria indicated under Alternative D, but Alternatives A and B do not limit use of TNR. Since grazing can result in water quality impacts from soil compaction and vegetation removal, as well as direct impacts from congregation of animals in riparian areas, Alternatives A and B have greater potential for these impacts than Alternative D. TNR also has the potential to reduce impacts on water resources associated with fire, since the primary purpose of TNR would be to reduce fuel and cheatgrass infestations that increase the potential for fire.

Management Action A-LG 5.3 calls for all new spring developments for livestock watering to be constructed in such a way as to maintain, improve, or restore the biotic integrity of the spring system. Under Alternative A this would be accomplished by the following:

- Ensuring proper installation of water developments;
- Protecting newly developed springs, wetlands, and riparian areas by fencing to exclude livestock and WHB; and
- Placing troughs away from springs and riparian areas.

These actions are intended to minimize impacts on water resources.

Individual Effects under Alternative B

Alternative B closes over 290,000 more acres to grazing than Alternative A and therefore would provide more beneficial impacts on water quality than would Alternative A.

Action B-LG 1.4 calls for voluntary submittal of annual grazing plans by the permit holder for BLM approval. These plans would require BLM approval of methods and criteria for evaluating impacts, including impacts on water resources, and coordination with the permit holder on corrective actions. If voluntary grazing plans are not submitted, management decisions would default to existing grazing permits. The goal of both permits and grazing plans is to achieve land health standards, but the grazing plans allow for more active participation of the permit holder in developing effective management actions. The impacts on water resources are expected to be beneficial since land health standards include minimizing soil loss and protecting riparian areas.

Action B-LG 5.3 is the same as under Alternative A and is intended to minimize impacts on water resources.

Individual Effects under Alternative C

Option 1

Option 1 reduces grazing use of rangeland during critical growing periods, and generally allows grazing to be curtailed or revised if land health standards cannot be maintained.

Option 1 calls for closing about 296,000 more acres to grazing than Alternative A and so would be more protective of water resources than would Alternative A.

Grazing permits and annual authorizations would only be issued when grazing is complementary and secondary to other resource values. This is potentially a far more stringent limiting requirement than under Alternatives A and B and could result in reductions in grazing allocations. Specifically, Action C-LG 1.4 (Option 1) implies that if water resources are not protected by grazing and grazing is not complementary to the resource value obtained from the water resource in a given allotment area, then the grazing permit would not be issued.

Alternative C (Option 1) would effectively remove and reduce range improvements, such as water developments, in the context of making grazing secondary to other resource values.

Alternative C (Option 1) would allow relinquishment of grazing permits, effectively making the issuance of permits competitive, and increasing the likelihood that lands would be permanently taken out of grazing, since, once permits are not renewed, other resource values would have greater probability of superseding grazing. For example, wildlife and recreation might rapidly become higher values on lands where grazing permits have been relinquished.

TNR would not be allowed, limiting the options available for addressing fire hazards associated with invasive species such as cheatgrass, and with over-abundant fuel, and therefore increasing the potential for impacts on water resources associated with fire.

Alternative C (Option 1) would not allow new spring developments to support livestock grazing. This would effectively result in a phaseout or reduction in grazing in some allotments. The measure may not be protective of undeveloped springs, but other actions described above give rangeland managers broad authority to limit impacts on undeveloped springs if they occur.

Action C-LG 5.3 calls for restoring or developing springs to benefit wildlife, rather than livestock. No new springs would be developed to support livestock, and newly developed springs would be fenced to exclude livestock and WHB. The combination of these actions is expected to reduce impacts on water resources to a greater extent than under Alternative B.

Option 2

Option 2 excludes grazing. No grazing would lead to reduced impacts on water resources. It would have the potential for altering vegetation cover, increasing water retention of watersheds, slowing erosion, reducing nutrient and pathogen loading to streams and other water bodies, and would generally contribute to PFC of riparian areas and consequently to improved water quality. As indicated in the Vegetation Management discussion, Option 2 would not allow prescribed burns. Increased vegetation cover resulting from no grazing might lead to increased wildlife and WHB

populations, but it would also result in higher fire risk in some areas. (See separate discussion of impacts on water resources from wildlife management, WHB management, and fire management.)

Individual Effects under Alternative D

Alternative D would close about 313,000 more acres to grazing than would Alternative A. Closure provides the highest level of protection to water resources because livestock impacts from turbidity, fecal coliform, and nitrates would be eliminated. Riparian areas closed to livestock grazing would achieve proper functioning condition in the short term, and functionality can be used as a surrogate for water quality.

Grazing permits would be issued if it is consistent with existing policy and standards. Action D-LG 1.4 would make issuance of grazing permits contingent on achieving or moving toward land health standards and guidelines, implementation of rangeland standard operating procedures, and consultation with USFWS. Progress would also be evaluated in the context of PFC objectives discussed under Riparian/Wetland Management. Achievement of these standards would result in beneficial impacts on water resources, compared to current conditions, by reducing soil erosion that leads to sediment loading, reducing soil compaction, and other factors that degrade water quality.

Alternatives A, B, and D allow TNR. Under Alternative D, TNR would be allowed without further analysis when a number of specified criteria are met; making TNR potentially more implementable under Alternative D than under Alternatives A and B. TNR would not be used in sensitive riparian areas, or where T&E habitat is present. TNR introduces the potential for impacts on water resources such as increased erosion from soil compaction, soil disturbance, and removal of vegetation cover, which would not occur under Alternative C. However, because the purpose of TNR would be to control invasive species, or reduce fuel, the effectiveness of TNR with respect to impacts on vegetation and soils would be closely monitored. Therefore, although use of TNR introduces some risk to water resources from grazing that would not occur under Alternative C (Option 1), it also provides an option for reducing potential impacts on water resources from fire.

Action D-LG 5.3.1 under Alternative D is similar to the corresponding action under Alternatives A and B. However, Action D-LG 5.3.1 provides more explicit guidance than Alternatives A and B on how new spring or wetland-riparian water developments should be installed, providing greater assurance that upstream water quality would be protected.

Effects from Minerals Management

Effects Common to all Alternatives

General

The primary goal of mineral resource management is to "make federal mineral resources available to meet domestic needs, and to encourage responsible development of economically sound and stable domestic minerals and energy production, while assuring appropriate return to the public." This goal does not necessarily have to conflict with the goal of "minimizing [impacts on] other resources," such as water resources, and "preventing unnecessary or undue degradation."

In practical terms, based on past experience, the degree of impacts (especially long-term impacts) on water resources will likely depend highly on careful planning to accurately identify and quantify the

impacts before a mineral project is started and on providing adequate financial assurances that impacts will be prevented or mitigated if they occur.

Thus, it is important that projects be carefully reviewed to ensure that they are bonded. Nearly all mineral extraction or geothermal energy projects must pass through a public review process, in which the general public, public agencies, and stakeholders are given the opportunity to comment on project plans and identify the means by which the project proponent will comply with the management goals of "minimizing [impacts on] other resources, returning disturbed lands to productive uses, and preventing unnecessary or undue degradation."

Mineral resources development projects have the potential for impacting water resources in a variety of ways, and project impacts will vary greatly based on resource-specific and project-specific conditions. At the general level, a supply of water is usually needed to meet process requirements and to meet the demand created by workers, support facilities, and economic growth or development that may result from the project.

Mineral resource projects also generally generate waste, including wastewater and waste solids that may come into contact with water. For some mineral extraction projects, dewatering is required that may generate large volumes of wastewater or fluids that must be contained until they can be safely discharged.

In most cases, compliance with existing laws, regulations, and policies is sufficient to ensure that water resources will be protected. However, it remains very costly to clean up environmental damage once it occurs, so planning, prevention, and monitoring are the most important aspects of compliance.

Most of the mineral resources management actions relate to the goal of "assuring long-term health and diversity of the public lands by minimizing impacts on other resources, returning lands disturbed to productive uses, and preventing unnecessary or undue degradation." As a result, these actions are generally expected to have beneficial impacts on water resources. The alternatives differ primarily in their emphasis, as dictated by slightly different objectives. For example, Objective MR 1 is the same for all of the alternatives: to return lands to condition compatible with FLPMA, the Surface Management Regulations at 43 CFR 3809, and other applicable laws. Alternative B expands on this objective to specify that lands disturbed by mineral operations should remain in a condition that provides for continued economic activity. By contrast, Alternative C emphasizes that the lands should be restored to approximately preoperational topography and vegetation, and if previously disturbed, then to a stable natural-appearing form. Alternative D allows for delaying or limiting the degree of restoration if a viable plan is in place for productive use of the site. None of the actions identified to achieve these objectives requires or implies that degradation or depletion of water resources will occur.

All else being equal, the more restrictions on mineral development and the more land excluded from development, the less likely it is that water resources impacts would occur, although projects may differ greatly in the potential to impact water resources. Therefore, the assumption is that mineral stipulations to protect wildlife or other resource values would also indirectly provide protection of water resources.

Salable

None of the alternatives requires or implies that degradation or depletion of water resources will occur.

Fluid

Fluid minerals (oil, gas, and geothermal resources) have relatively limited potential to impact water resources within the WDO, based on existing reconnaissance data about the occurrence of these minerals. Therefore, in practice, the alternatives would have similarly low potential for impacts on water resources by fluid mineral activities.

Solid

Most leasable solid minerals, such as coal and bitumen or phosphate, are not plentiful in the WDO. Perhaps the most important leasable solid mineral is potash. Therefore, for practical purposes, few impacts on water resources are expected to result from development of these resources. The impact on water resources would parallel the impacts discussed for fluid minerals.

Locatable

Locatable minerals, which include precious metals and gems, are the most important economic mineral resource type in the WDO. All of the alternatives would maintain over seven million acres open to locatable mineral development. Mining operations include large open pit gold and silver mines. Open pit mining operations can threaten both groundwater and surface water quality.

Individual Effects under Alternative A

Objective MR 1, which addresses rehabilitation of disturbed lands, varies among the alternatives, so the management actions vary. As a result, the outcomes with respect to water might be expected to differ also; however, this is not necessarily the case because current mining regulations provided significant assurances that mines would be properly closed and the land rehabilitated.

Compared to other alternatives, objective A-MR 1 includes the fewest specifics regarding closure. It calls for returning lands to safe, stable, productive, and visually compatible condition in accordance with applicable regulations, and preventing undue and unnecessary degradation of public lands. In the past, reaching these objectives has been slowed, particularly with large locatable open pit mining operations, by lack of adequate funding and because mining operations expanded without adequate planning, leading to larger areas requiring rehabilitation than originally anticipated. Adequate funding was an issue because rehabilitation costs accrue at the end of mining activities, when mines are no longer productive and do not generate the profits needed to support rehabilitation costs. Although Alternative A is the least specific of the alternatives, with regard to rehabilitation requirements, current regulations would provide similar assurances under all alternatives that water resources would be protected after mining operations cease or are temporarily curtailed.

Salable

Alternative A would maintain about 6.8 million acres open to disposal of salable minerals (rock quarry operations, gravel pits, and construction and building materials). These are typically small

sites, most of which would be developed by municipalities or other government agencies for roads or other public projects. Some gravel operations involve dredging stream gravels and can directly impact surface water. However, since salable minerals are widespread in the WDO, quarry operations can generally be located away from perennial streams. Typically, salable minerals do not contain significant amounts of soluble constituents that may leach from the waste material even if it comes into contact with water. Therefore, most quarry operations in the WDO present minor threats to surface or groundwater quality.

Alternative A does not include management actions to address many of the issues addressed in the other alternatives.

Fluid

Impacts on water resources from fluid mineral development activities include soil disturbance due to construction of roads, pipelines, and structures, which can increase erosion and lead to sediment loading of streams; spills and releases of petroleum or other chemicals, which can degrade surface or groundwater quality; and groundwater extraction and injection activities (especially of geothermal fluids) that can impact aquifers, alter groundwater flow regimes, and under some conditions cause groundwater quality degradation. The impacts would be specific to each area of fluid mineral development, and environmental impacts would be analyzed in detail in project-specific environmental documents, as required by NEPA.

Under Alternative A, fewer than half a million acres would be closed to fluid mineral development, and about 30,000 acres would be subject to No Surface Occupancy stipulations. These restrictions would result in protections from water resources impacts in these areas, although Alternative A includes fewer restrictions than other alternatives. But there are few oil and gas reserves in the WDO, and even geothermal resources are relatively limited. Most known geothermal resources are accessible at lower elevations on or near valley floors, where surface water quality naturally degrades toward the center of the basin. Geothermal operations typically rely on reinjection of geothermal fluids, so that water consumption is relatively low, and geothermal fluids are typically brines that reside within aquifer systems that are hydrologically isolated from potable water resources. Therefore, as a practical matter, the impacts on water resources from fluid mineral resources are expected to be relatively minor and would be evaluated and mitigated project by project.

Solid

As with any mineral extraction activities, solid minerals extraction could result in ground disturbance, leading to erosion and sediment loading to surface water. Such impacts would be addressed through BMPs, including avoidance. In practice, leasable solid minerals are not plentiful in the WDO, so few impacts on water resources are expected to result from development of these resources.

Locatable

Operations to extract locatable minerals represent the principal source of adverse impacts on water resources (from minerals management) within the WDO. Historically, mining operations have increased in size and volume of rock processed. Large open pit mining involves the following:

- Removing overburden and country rock to expose ore bodies;
- Removing ore from sites that are often hundreds of acres in area to depths of hundreds of feet; and
- Processing millions of tons of ore, which creates waste that contains uneconomical residual sulfides, heavy metals, and residual process chemicals that can leach from the rock when exposed to atmospheric conditions and water.

In those cases where the mine must be excavated to depths well below the regional water table, mining operations often require dewatering large volumes of water, which may or may not require treatment before discharge. Processing the ore requires large volumes of water and the use of chemicals, including cyanide, surfactants, and other compounds that may be highly toxic if they are released into the environment. Unless the waste materials and process water are contained and isolated they may present a long-term threat to water resources. These impacts apply to open pit mining operations as well as to subsurface tunnel mining operations. Rehabilitation of large mining operations is costly and often involves construction of containment and treatment systems that may require long-term indefinite monitoring and maintenance to prevent impacts on water resources far into the future. Pit mine operations sometimes result in pit lakes, where the pit has been excavated below the water table, so that the lake is maintained by groundwater. The water may become acidic by contact with sulfide or other minerals in rock that has been recently exposed by mining operations, and the acidity may increase concentrations of metals relative to surrounding groundwater. In addition, the water may present a threat to wildlife or human health.

Actions A-MR 1.1 and 1.2 call for reclaiming mineral extraction sites, but provide minimal guidance to land managers to ensure that impacts on water resources do not occur.

Action A-MR 9.2 under each of the alternatives calls for withdrawal of lands from locatable mineral development on a case-by-case basis and notes that any mineral withdrawal of more than 5,000 acres must be initiated by Congress. Mineral withdrawal would prevent effects on water resources resulting from mineral extraction. Under Alternative A, 60 acres at Porter Springs is currently identified for mineral withdrawal. Alternatives A and B propose fewer acres for mineral withdrawal than Alternatives C and D.

Individual Effects under Alternative B

Objective B-MR 1 amends A-MR 1 to add that lands disturbed by mineral operations should remain in a condition that provides for continued economic activity at the site. Mineral activity is sensitive to commodity price, so that mining activity may stop when prices make continued operations uneconomical; however, the same mine may become economical when the price rises or the extraction cost decreases. Closing a mine and rehabilitating the land could make restarting operations more expensive. In some cases, continued activity may generate the revenues needed to support additional rehabilitation. Therefore, planning mineral operations in such a way as to facilitate reopening mineral operations may result in beneficial impacts on water resources. However, Action B-MR 1.1 calls for reclamation activities to be implemented only when there is no reasonable prospect for continued use. This makes rehabilitation highly contingent on the interpretation of what is a "reasonable prospect," and could delay rehabilitation indefinitely. To counter this, Action CA-MR 1.1 calls for interim reclamation measures to be employed whenever

facilities would remain unused for more than one year. If interim measures are adequately funded and effective (which would be evaluated in project-specific environmental review of mining permits), then these measures could result in minor impacts on water resources.

Salable

Like Alternative A, Alternative B would maintain about 6.8 million acres open to disposal of salable minerals. More acres (about 4.5 million) would be open with only standard stipulations than under Alternatives B and D. About 1.4 million additional acres of WHB HMAs would also be subject to seasonal or other restrictions. About 0.87 million acres would be open only to permits to government entities. About 0.42 million acres would be closed to mineral material disposal altogether. Alternative B is the least restrictive of the alternatives and therefore would have the greatest potential for adverse impacts on water resources.

Fluid

Just over one million acres would be closed to fluid mineral development under Alternative B, and about 0.22 million acres would be subject to No Surface Occupancy stipulations. These restrictions would protect more water resources than under Alternative A (but less than under Alternatives C and D) by reducing the number of acres on which soil-disturbing activities or potential pollution sources could be located.

Solid

Effects on water resources are negligible, as described for Alternative A.

Locatable

As discussed under Alternative A and above in respect to Actions B-MR 1.1 and B-MR 1.2, impacts on water resources from Alternative B are less than those under Alternative A.

Action B-MR 9.2 is the same Action A-MR 9.2, with 60 acres at Porter Springs currently identified for mineral withdrawal.

Action B-MR 9.5 calls for compliance inspections only to the extent required by law or regulation. Thus, although this action is not specified under Alternative A, both Alternatives A and B are equivalent, with respect to compliance inspections.

Individual Effects under Alternative C

Alternative C effectively provides managers with discretion to deprioritize mineral development where the development would conflict with other significant resource values, giving greater emphasis to the protection of water resources.

Objective C-MR 1 provides additional specific guidance regarding rehabilitation of mineral sites that is not included in Alternative A and would help to reduce potential impacts on water resources. It calls for restoring lands to approximately preoperational topography and vegetation. These objectives are translated into management actions in Action C-MR 1.1. Restoring preoperational topography may help to reduce surface erosion, particularly in areas where the topography was

relatively level. Restoring native vegetation would probably have no impact on water. Otherwise, the rehabilitation actions specified in Alternative C are equivalent to those in Alternative B.

Salable

Alternative C opens about 200,000 fewer acres to salable mineral extraction than Alternatives A and B. About 3.6 million acres would be open only to permits to government entities. About 0.70 million acres would be closed to mineral material disposal altogether. Alternative C is more restrictive of salable mineral disposal because it specifies that salable mineral disposal would be open only where it is compatible with important resource values.

Fluid

Alternative C maintains the fewest acres open to fluid mineral leasing (2.8 million acres compared to more than 6 million acres for each of the other alternatives) and the largest number of acres closed (4.4 million, compared to just over one million acres under Alternatives B and D, and less than half a million acres closed under Alternative A). Alternative C also makes the most restrictive stipulations to protect other resource values.

Solid

Effects on water resources are negligible, as described for Alternative A.

Locatable

Alternative C includes more stringent protections of other resources, and more lands are identified under Alternative C for mineral withdrawal than under the other alternatives. Alternative C involves more stipulations and restrictions on use than the other alternatives, in keeping with the objective of giving maximum protection to other resources. As a result, Alternative C would indirectly afford the highest level of protection of water resources. Alternative C also includes provisions for off-site mitigation of impacts on resources at every opportunity available. As a result, water resources impacts that occur in one area might be mitigated by offsetting the impact with improvements in another area. This gives land managers a tool to allow a project to go forward if the proponent can provide compensation for the effects.

Under Alternative C, in addition to the 640 acres at Porter Springs identified for mineral withdrawal under Alternatives A and B, a number of other areas, each smaller than the 5,000-acre limit requiring congressional approval, are identified for mineral withdrawal. Most of these are also included in Alternative D, but Alternative C also identifies ACECs in Pine Forest, Raised Bog, and the Stillwater Mountains, for mineral withdrawal. Thus, Alternative C would withdraw the largest number of acres and is expected to result in the largest beneficial impact on water resources.

Action C-MR 9.5 calls for sufficient compliance inspection to not only ensure conformance with the notice or approved plan (as under Alternative D), but also to maximize protection of other resource values. Through this action, Alternative C contains a mechanism to provide greater protection of water quality, including both groundwater and surface water (such as in pit lakes), than under the other alternatives.

Individual Effects under Alternative D

Overall, Alternative D restricts use on more acreage than Alternatives A and B, but fewer acres would be restricted than under Alternative C. By this measure, Alternative D would provide greater protection to water resources than would Alternatives A and B but less protection than under Alternative C.

Objective D-MR 1 is generally equivalent to that under Alternative B. However, Action D-MR 1.1 calls specifically for addressing post-operational use and site reclamation configuration before mineral development. This enables BLM to ensure that rehabilitation is adequately addressed before mineral operations start and allows monitoring and corrective action elements to be required so that rehabilitation efforts are adequately sized and modified if mining operations expand.

Salable

Alternative D opens about 350,000 fewer acres to salable mineral extraction than Alternatives A and B. About 3.5 million acres are open with only standard terms and stipulations. In addition, about 1.2 million acres would be subject to seasonal or other restrictions, such as lands within two miles of an active sage-grouse lek during the nesting season, and within WHB HMAs. About 1.8 million acres would be open only to permits to government entities. About 0.74 million acres would be closed to mineral material disposal altogether. Assuming that these restrictions would provide indirect protection from potential impacts on water resources, Alternative D would have lower potential for water resources impacts than under Alternative B and greater potential than under Alternative C.

Fluid

Alternative D would maintain slightly fewer acres (about 70,000) open to fluid mineral leasing than would Alternative B. About 1.1 million acres would be closed to leasing, and about 0.33 million acres would be subject to No Surface Occupancy stipulations. Alternative D is more restrictive, and therefore more protective, of water resources than under Alternatives A and B, but it is less protective than under Alternative C. However, although large areas are open to fluid mineral development, geologic conditions are not favorable to fluid mineral development (other than geothermal) in the WDO, so the risk of adverse impacts on water resources from most fluid mineral leasing is low under all alternatives. Geothermal potential is not high in most areas of the WDO outside the Black Rock Desert, so even considering geothermal resources, the practical differences between the alternatives are not as large as they seem, based on acreage open to leasing alone.

Solid

Effects on water resources are negligible, as described for Alternative A.

Locatable

Slightly fewer acres would be open to locatable mineral development under Alternative C than under Alternative D, but both would open fewer acres than Alternatives A and B. As described above, rehabilitation planning would be required before mining operations begin, providing additional assurance that long-term impacts on water resources would be minimized.

Water resources benefits are greater than under Alternatives A and B but less than under Alternative C. Alternative D includes most of the proposed mineral withdrawals as Alternative C, except the Pine Forest, Raised Bog, and Stillwater Mountains ACECs. Alternative D requires compliance inspections sufficient to meet policy and to ensure conformity with an approved plan but without additional protections, as under Alternative C.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to all Alternatives

Many recreation destinations center on areas where perennial surface water is present, such as streams or lakes in upper watersheds. These are often sensitive areas, where increased visitor use might lead to soil compaction (as at campsites or on trails), increased use of OHVs, and generation of water pollutants (sanitary waste, pathogens). Increased visitor use might require additional support facilities and infrastructure, such as improved access roads, potable water, sanitary facilities, waste disposal, and other facilities. Each of these can have adverse impacts on water resources. Improved access may lead to more visitor use and demand for more support facilities. Many areas of the WDO are remote, but there is increased demand for recreation opportunities from urban expansion in the Reno area. Visitors from outside the WDO are more likely to stay longer and to require facilities to support extended stays. Therefore, increased concentration of visitor use on few areas with desirable riparian settings are likely to result in increased impacts on the water resources in those areas.

Similarly, demand for OHV use areas is increasing. OHV use can disturb soils and increase erosion. As with most recreational activity, OHV destinations will typically include riparian areas, which are particularly vulnerable to OHV use. All of the alternatives include measures to monitor and control visitor use and associated impacts on other resources, but the alternatives differ in the degree and type of recreational development they would promote.

Except for Alternative A, each of the alternatives calls for an inventory and designation of routes and trails throughout the WDO in limited and closed areas. This inventory is important to identify and minimize areas that have contributed to or that may contribute to impairment of surface water and other resources and uses.

Individual Effects under Alternative A

Unlike the other alternatives, Alternative A does not explicitly include any adaptive management actions. Adaptive management is a tool that enables resource managers to monitor and evaluate responses to a management action and to adjust the management action based on the observed responses. Adaptive management is effective when the impacts of a prescribed action are not adequately predictable or if there are potential significant adverse consequences of implementing an action. Under Alternative A, any benefits to water resources that may be derived from adaptive management would not occur.

All of the alternatives allow dispersed recreation throughout the WDO, but Alternative A includes no detailed criteria for managing dispersed recreation, while the other alternatives do. These criteria would help to protect water resources. Lack of criteria in Alternative A could result in additional impacts on water resources.

Alternative A would continue management of existing SRMAs rather that designating new ones, as in the other alternatives. Designation of new SRMAs is a response to known and perceived public demand for recreational opportunities. SRMAs provide a means of formally planning and managing recreational uses within a defined geographic area. Designation of SRMAs would not impact water resources. Management actions applied to SRMAs may result in effects on water resources. Outside of SRMAs, management of recreational uses is more generalized and use oriented rather than location oriented and is managed largely through Special Recreation Permits. SRPs would be issued on a case-by-case basis and would set particular requirements according to the requested use. They apply mainly to organized group activities, such as OHV events. Outside of SRMAs, SRPs are the primary tool for protecting water and other resources.

Action A-R 3.1 would not promote visitation to areas where increased recreation use could create unacceptable impacts. This action calls attention to the possibility that such areas may exist and provides a tool for preventing impacts, including impacts on water resources. Since sensitive riparian environments are often desirable recreation destinations, this action could result in a beneficial impact on water resources. This action is included in Alternatives C and D but not in Alternative B.

Most of the WDO (6,782,790 acres) is open to OHV use. Alternative A would close 24,832 acres to OHV use, (including 17,436 acres in the Pine Forest Area, 141 acres in the George Lund Petrified Forest, and 4,555 acres for bighorn sheep habitat during the lambing season, 121 acres of Zone 1 in Water Canyon, and 2,579 acres in Zone 2 of Water Canyon). This is about 400 acres more than under Alternative B. It would limit OHV use to existing trails on 416,570 acres. Since OHV use disturbs and compacts soil, closure to OHV use is expected to reduce impacts on water resources in these areas.

Individual Effects under Alternative B

Alternatives B, C, and D each include similar adaptive management measures recognizing the need to protect other resource values as recreational use expands. This may help to adjust visitor use to prevent adverse effects on water resources.

Alternative B would rely on permit systems to limit visitor use in areas that are overcrowded. The other alternatives do not include this measure. Overcrowding may have adverse impacts on water resources, including damaging soils and vegetation cover and increasing pollutant sources and fire danger.

Alternative B (and Alternative D) designates over six million acres as an extensive recreation management area (ERMA). Among the criteria that would benefit water resources, consistent with state regulations, is a prohibition on camping within 300 feet of a spring. This would help to further prevent adverse impacts on water quality.

Alternatives B and D would designate three new SRMAs, within which certain recreation uses would be emphasized and supporting infrastructure would be developed.

The Nightingale SRMA includes 925,593 acres and would be subdivided into five recreation management zones, in which a high interaction with the natural world and strong dependency on equipment would be promoted. The Nightingale SRMA includes relatively low motorized and mechanized use in four of the five zones. Higher elevation areas (the Selenite Mountains WSA and

the Mount Limbo WSA, totaling 55,743 acres) would be primarily maintained for hiking, camping, and hunting, with little motorized use. The Blue Wing and Shawave Mountains (59,738 acres) would be used primarily for hiking, backpacking, hunting, and camping. The Blue Wing and Winnemucca Lake Playas (34,511 acres) would be used for competitive and commercial events. The largest zone is a 773,968-acre area in which the primary activities would include OHV and 4x4 use and motorcycle travel. Motorized trail use, car camping, and other developed uses imply increased risk to water quality. Because motorized uses in the Nightingale SRMA would occur mainly on low elevation lands with sparse, low quality water resources, impacts on water resources would be minimized.

The Winnemucca SRMA includes 151,824 acres subdivided into six Recreation Management Zones. The largest of these are the Sonoma Range (91,156 acres) and the Winnemucca Sand Dunes (34,922 acres). Both areas would include OHV use among the primary activities. Also included are lowland and upland zones of Water Canyon (121 acres and 2,579 acres, respectively), the Bloody Shins RMZ (13,084 acres), and Winnemucca Mountain (10,119 acres). All areas would include OHV use, as well as mountain biking. Overnight camping would not be allowed in the upper portion of Water Canyon. The Winnemucca Mountain RMZ contains a paved road to a scenic overlook. Most of the Winnemucca SRMA is on low elevation sage brush rangeland, including the Sonomas.

The third new SRMA is the Granite Range SRMA (95,972 acres), adjacent to the Black Rock Desert. It would include two RMZs. The Granite Foothills RMZ (69,252 acres) is at the entrance to the Black Rock Desert, and private entities would be encouraged to develop visitor facilities there. The Buckhorn/Granite RMZ (26,720 acres) would be managed for hiking, camping, viewing, and hunting. The Granite Range SRMA contains numerous springs but no reservoirs.

The Pine Forest SRMA (98,874 acres) would be expanded. The primary activities in the Pine Forest SRMA would be backpacking, hunting, fishing, canoeing, and primitive camping. It includes three RMZs: Pine Forest Lakes (25,000 acres), Pine Forest Creeks (73,717 acres), and Knott Creek (164 acres). Although the area is remote and gets relatively few visitors, use of the area is focused on water, enhancing the potential for impacts on water resources if visitor use increases.

About 1,460,321 acres on flat playa surfaces and checkerboard lands would be open to OHV use under Alternative B. Alternative B would close 24,832 acres to OHV use in the same areas as under Alternative A. It would limit OHV use to existing trails on 5,445,369 acres. Since OHV use disturbs and compacts soil, closure to OHV use is expected to reduce impacts on water resources in these areas.

Individual Effects under Alternative C

Alternative C would develop and provide access to new water-based recreation only when a public need has been identified. Compared against Alternatives A and B, this suggests that fewer new water-based recreation sites will be developed under Alternative C. The impact on water resources would probably be small, but Alternative C would likely avoid some impacts on water quality from introduction of pathogens, pollutants, and erosion related to construction of access and other facilities. New water-based activities are likely to be centered on relatively few areas.

Alternative C designates over seven million acres as an ERMA. In addition to the criteria under Alternatives B and D that would be applied throughout this area, camping would be prohibited

within 300 feet of spring sources, consistent with state regulations. This would help to further prevent adverse impacts on water quality.

Alternative C includes designation of the Winnemucca SRMA (it does not include the Nightingale or the Granite Range SRMAs that are included in Alternatives B and D). Under Alternative C, the Winnemucca SRMA would not include the Winnemucca Sand Dunes RMZ, which is primarily an OHV use area. All three alternatives include the Pine Forest SRMA, which would be only about a third as large under Alternative C as under Alternatives B and D.

Alternative C emphasizes more wilderness and primitive experiences and involves much less development of new infrastructure than Alternatives B and D. As a result, Alternative C is likely to encourage less concentrated and organized recreational uses and less recreational uses overall, with consequently lower risk of impacts on water resources.

About 61,382 acres would be closed to OHV use under Alternative C, including the same areas that would be closed under Alternative D, plus about 25,945 acres in the Blue Wing area. About 291,850 acres would be open. It would limit OHV use on 7,143,400 acres, which would reduce potential impacts on water resources from OHV use more than any of the other alternatives.

Individual Effects under Alternative D

Alternative D, like Alternative B, includes three new SRMAs.

About 291,850 acres would be open to OHV use under Alternative D, which would close 35,437 acres to OHV use in sensitive areas. It would limit OHV use to existing trails on 6,876,824 acres. Based on these closures and limitations, Alternative D is expected to have water resources effects (primarily from sediment loading) that are intermediate between Alternatives B and C.

Effects from Renewable Energy

Effects Common to all Alternatives

Development of renewable energy will require road access to the sites. All projects would involve construction, soil disturbance, and the potential for enhanced erosion to impact surface water quality. Solar projects tend to be located on level terrain, such as on valley floors, where there are few sensitive surface water resources, and soil erosion by water would tend not to be significant.

Wind farms typically consist of a series of turbines located along ridges, at the highest points in a watershed. Typically, soils are thin and the terrain is rocky in these areas. Although soil erosion may be enhanced, the effects on surface water resources are likely to be small. However, there may be few existing roads and these may be unsuitable for transporting the components and equipment to the site. Constructing new roads or improving existing roads is likely to result in enhanced erosion and a potential threat to surface water quality. Roads would need to be maintained to allow continued access for turbine maintenance.

Biomass projects would likely be located on valley floors, in areas that are not far from the sources of biomass, such as urban or agricultural areas. Biomass production is low in the WDO and is likely to result in only minor adverse impacts on water resources.

Construction impacts on water resources would be mitigated through BMPs.

Individual Effects under Alternative A

Action A-RE 1.3 would maintain existing exclusion areas applicable to wind energy projects in WSAs, ACECs, TCPs, and critical habitat areas. While these would reduce the potential for water resources impacts in sensitive areas, they would not address impacts in other areas. Project-specific NEPA environmental review would be performed. Construction-related impacts would be mitigated by implementing BMPs.

Individual Effects under Alternative B

Action B-RE 1.2 would designate avoidance areas, and granting of ROWs would include stipulations to mitigate impacts on water resources. As discussed above, the principal source of impacts on water resources is likely to result from constructing, improving, and maintaining access roads to remote wind farm sites.

Alternative B would not designate any exclusion zones, but each project would undergo project-specific environmental review so that the merits of each site would receive public scrutiny, and environmentally unfavorable sites would likely be rejected.

Individual Effects under Alternative C

As with mineral leases, Alternative C would reduce impacts through development of lease stipulations to protect other resources. Alternative C would designate 1.2 million acres of exclusion zones and nearly one million acres of avoidance areas. Less available area and exclusion of more sensitive lands is expected to reduce the potential for impacts on water resources under Alternative C, relative to the other alternatives.

Individual Effects under Alternative D

Alternative D would designate 1.3 million acres of avoidance areas and about 0.6 million acres of exclusion zones, which is similar to but slightly less protective than Alternative C.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Little or no new road construction is expected under any of the alternatives because almost every area within the WDO is accessible by some form of road. However, existing roads may require improvement to accommodate actions under each of the alternatives.

Most of the management actions are the same for all alternatives, or at least for Alternatives B, C, and D. Differences in impacts on water resources would derive less from transportation and access management and more from the different road densities and construction techniques required to implement the alternatives.

As discussed under Effects Common to All Alternatives for Recreation Management and consistent with management action TA 4.1, an inventory of all roads in the WDO would be undertaken under Alternatives B, C, and D to identify potential sources of impacts and to identify roads that should be removed or improved.

Roads have the potential to impact water resources during construction and maintenance and in normal operation. Roads collect, divert, concentrate, and otherwise alter natural drainage patterns and create potential for erosion during construction and use in the case of unimproved roads. They introduce pollutants via petroleum-based paving materials, deicing materials, dust palliatives, and spills from vehicles using the roads. Also, they provide routes for human activities to be rapidly introduced into new environments. Inadequately sized or poorly designed culverts, inadequate drainage and shoring, poor roadbed design, and other engineering issues can result in erosion or slope failure, leading to enhanced sediment transport to streams. Road surfaces can be preferential pathways for runoff. They cross every type of terrain and feature, from playa to sage lands to riparian corridors, interrupting natural continuity and creating abrupt boundaries. Roads may cut and undermine slopes, and road fills may block natural drainage features. Each mile of a 15-foot-wide roadway represents nearly two acres of compacted soil taken out of productive use. These impacts are similar under each of the alternatives, but the alternatives would differ greatly because of differences in total road miles that would be required to implement the various management actions. Roads also allow OHVs to penetrate all areas of the WDO, and OHV trails create additional erosion impacts. There are currently no accurate estimates of road density in the WDO and no estimate of the density of OHV trails. In many areas, perennial streams follow narrow canyons or gullies with steep side slopes, where the most favorable flat land for building a road is on the floodplain of the stream. The narrow valley floors require many cuts and fills that create potentially unstable roadbeds or slopes, and the unstable soils contribute to sediment impacts in the adjacent streams.

Decommissioning roads may result in short-term impacts on water resources from soil disturbance until vegetation and slope stability are reestablished.

Individual Effects under Alternative A

Under Action A-TA 1.6, Alternatives A, C, and D would improve or decommission roads that are presenting problems to the environment. These problems are described generally above, and since many of the problems created by roads have to do with impacts on water resources, decommissioning problematic or unnecessary roads and improving existing roads is expected to result in beneficial impacts on water resources.

Under Alternative A, Action A-TA 5.1.1, funds for new restroom facilities would be requested. This action is carried over to Alternatives B and D, but not C. The construction of restroom facilities would partially mitigate impacts on water quality associated with visitor use of recreation sites in the WDO.

Individual Effects under Alternative B

Under Action B-TA 1.6, Alternative B would decommission roads only if alternative access is provided, and B-TA 4.1 calls for working with local communities to recognize their needs before decommissioning roads. Potentially much larger cumulative road miles are needed to accomplish the objectives of Alternative B, compared to Alternative C. Although no roads would be built as a direct result of Alternative B, it presents greater potential for impacts on water resources because of the greater number of roads that would be retained, improved, maintained, and used (such as to provide access to OHV drivers).

Action B-TA 4.3 calls for removing, rerouting, or rehabilitating roads or trails that adversely impact wildlife, but only if alternative access is provided. As discussed under Transportation and Access Management, decommissioning roads could result in beneficial impacts on water resources. Some of these benefits would be offset by providing alternative access.

Individual Effects under Alternative C

Based on evaluation of other management actions, and restricted or excluded acres under Alternative C, Alternative C would require the fewest road miles and least transportation facility construction of the alternatives, so this alternative is expected to have the fewest adverse impacts on water resources.

Action C-TA 4.1 calls for limiting access to habitat areas through an active road and trail closure policy, emphasizing closing roads for protection of habitat, rather than on maintaining roads to support community needs. The greater emphasis on habitat is likely to support lower road density and therefore to result in fewer impacts on water resources.

As under Alternative B, Action C-TA 4.3 calls for removing, rerouting, or rehabilitating roads or trails that adversely impact wildlife. But unlike Alternative B, the actions under Alternatives C and D do not require that alternative access be provided. As discussed under Transportation and Access Management, decommissioning roads could result in beneficial impacts on water resources.

Action C-TA 5.1.1 calls for not constructing restroom facilities, consistent with the general approach of minimizing increased visitor use of the WDO, and reducing associated impacts on resources. If, as expected, the existing restroom facilities are adequate to support future visitor use, then the impacts on water resources would be minor.

Individual Effects under Alternative D

Action D-TA 4.1 emphasizes protection of sensitive habitats and calls for closing or decommissioning roads and trails to achieve the appropriate road density. Appropriate road density would be determined relative to the overall objectives of the alternative for each resource area. Alternative D is generally intermediate between Alternatives B and C in terms of closed or restricted acres and other restrictions that would limit new projects and the need for vehicle access. Therefore, the number of roads that could be decommissioned would also be intermediate.

Decommissioning roads and trails under Action D-TA 4.3 is the same as under Alternative C, except that fewer roads may be decommissioned because of the different wildlife objectives of Alternatives C and D.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Continued management by the BLM provides public involvement in the decisions that affect those lands. BLM management may result in some benefits to water resources that would not occur under more dispersed ownership and management, particularly with respect to managing priority watersheds and other sensitive environments.

Most of the management actions are the same for all of the alternatives, but the impacts on water resources may differ because of different objectives of the alternatives.

Action LR 4.1.2 calls for a set of criteria to be considered when evaluating land acquisition actions. The criteria are the same for all of the alternatives, but the decisions taken under each alternative may differ because of the different objectives of the alternatives. The criteria to be considered in land acquisitions include public resource values, such as riparian areas, floodplains and wetlands, and fisheries, which would provide direct beneficial impacts on water resources because management of currently discontinuous holdings within watersheds could be more consolidated. Checkerboard ownership is an artifact of historical decisions to encourage construction of railroads, with no consideration of hydrologic conditions and natural watershed boundaries. In general, management of contiguous areas within watersheds would give the BLM improved ability to influence outcomes at the watershed level, including regulating access and effectively controlling uses to benefit water.

Divesting lands that have low value for protecting water and other resources, but that could benefit municipalities, and increasing the tax base provide an opportunity to offset the cost of acquiring lands under Action LR 4.1.2, with no impact on water resources. Land acquisitions and sales would be subject to project-level environmental evaluation and public participation under NEPA.

Under Alternatives B and D, private lands within wellhead protection areas would be given priority for acquisition on the theory that public ownership of certain watersheds containing municipal supply wells would provide better long-term protection of the water resource than private ownership would provide. Nevada regulations recognize "wellhead protection zones" and allow municipalities latitude in defining their boundaries. While state regulations and guidelines set minimum standards and focus on providing a high degree of protection to water users, adherence to the minimum guidelines may provide only moderate long-term protection for municipal water supplies.

Impacts on groundwater are not necessarily restricted to sources that migrate vertically downward and then travel at the rate of groundwater to municipal wells. Some uses can threaten the health of a watershed, reducing water retention and storage capacity. Some pollutants may be transported in surface water or by overland flow before migrating vertically to groundwater, so that groundwater flow rates do not adequately represent the level of threat.

State wellhead protection guidelines do not set any upper limit on the definition of source protection areas. Where feasible, priority watershed management is preferable to localized wellhead management because it sets management for long-term protection of municipal water supply as the priority watershed use.

Individual Effects under Alternative A

Under Management Action A-LR 1.3 of Alternatives A and D, not only would public lands in priority watersheds (wellhead protection areas expanded to include the watershed containing municipal water supplies) be retained, but private lands in specific municipal watersheds would be given priority for acquisition. Prioritization of use of these watersheds for public water supply protection would directly benefit water quality within these areas. To the extent that private lands are acquired, Alternatives A and D would provide greater protection to water resources than Alternatives B and C.

Individual Effects under Alternative B

Management Action B-LR 1.3 under Alternatives B and C calls only for retaining existing holdings within priority watersheds, rather than for acquiring private lands in priority watersheds as under Alternatives A and D. As a result, Alternatives B and C are less protective of municipal water supplies than are Alternatives A and D.

Individual Effects under Alternative C

Alternative C provides the most protection of water resources because it involves the least new developments and the most restrictions on human use, although Action C-LR 1.3 does not call for the BLM to acquire additional lands in priority watersheds to protect municipal water supplies.

Under Action C-LR 5.3, 877,426 acres would be designated as avoidance areas to protect resources, and 1.2 million acres would be designated as exclusion zones where no corridors, ROWs, or nonrenewable energy projects would be allowed, in order to protect wildlife habitat. These designations would be indirectly protective of water quality and water supplies since exclusion of such uses would reduce the potential for soil disturbance, introduction of pollutants, and all of the other activities described for each of the resources.

Individual Effects under Alternative D

Action D-LR 1.3 calls for the BLM to acquire private lands in priority watersheds to help protect municipal water supplies.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

The effects of ACEC/RNA management on water resources would be beneficial because they are intended to protect fragile resources from irreparable damage. Such areas are typically associated with high water quality and often include pristine upper watershed areas that are a source of high quality water to streams and aquifers at lower elevations. If they are functional, these areas also protect lower areas from flooding by retaining and delaying runoff. The alternatives differ in the amount of land they would protect. All of the alternatives include the 60-acre Osgood Mountain Milkvetch ACEC.

Individual Effects under Alternative A

There would be beneficial impacts on water resources from maintaining the Osgood Mountain Milkvetch ACEC.

Individual Effects under Alternative B

The impacts on water are the same as under Alternative A and would be beneficial.

Individual Effects under Alternative C

Alternative C includes three additional ACECs compared to Alternatives A and B. The additional designations would provide indirect beneficial impacts on water resources by protecting habitat and other values for approximately 97,500 acres.

Individual Effects under Alternative D

There would be the same beneficial impacts as those under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways provide visitors with improved vehicle access routes to areas that otherwise would not be visited because they are not easily accessible. The impacts on water resources would result from construction and maintenance of roads and from additional visitor use of these areas. However, since the byways are typically developed on existing routes, the effects on water resources are expected to be low.

Individual Effects under Alternative A

Action A-BCB 1.1.1 under both Alternatives A and D include evaluating the need for developing the Gold Country, Silver Backcountry, and Blue Lake-Knott Creek BCBs. As indicated above, byways may result in increased visitor use and consequent greater potential for some impacts on water resources, although the impacts are expected to be small.

Individual Effects under Alternative B

Alternative B would encourage greater use, partly to stimulate local economies. It does not specify additional byways to be evaluated. As indicated above, the impacts of byways on water resources are generally expected to be low.

Individual Effects under Alternative C

Alternative C would create the fewest new backcountry byways and would avoid areas that have received low visitor use. Therefore, Alternative C is expected to have fewer impacts on water resources than the other alternatives.

Individual Effects under Alternative D

The impacts are the same as those under Alternative A.

Effects from National Trails Management

Effects Common to All Alternatives

No impacts are expected.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

Designation of Wild and Scenic River status would afford immediate protection to those stream segments. If managed in the interim in accordance with this classification, certain types of development would be prohibited. WSR segments that are in priority watersheds would receive additional protection under each alternative regardless of final designation.

Individual Effects under Alternative A

Alternative A provides no additional protections of water resources because no streams are managed as WSRs in the WDO. However, priority watershed status and acquisition of private lands in priority watersheds would increase protection of the stream segments in the watersheds that are proposed as WSRs under the other alternatives.

Individual Effects under Alternative B

Alternative B does not provide specific guidance and relies on unspecified alternative management strategies to protect eligible segments and calls for providing multiple uses. Any protection of eligible WSR stream segments would be considered a beneficial impact on water resources. However, the benefits would be offset by any uses that may be incompatible with WSR status.

Individual Effects under Alternative C

Alternative C identifies three stream segments for protection, including the North Fork of the Humboldt River. If afforded WSR status, motorized use within the watershed may be restricted, and tributary streams may be protected consistent with protection of the main stem. Alternative C would provide protection to more streams than the other alternatives.

Individual Effects under Alternative D

Alternative D would limit protection to segments that are within priority watersheds, which may be more readily implementable than corresponding action under Alternative C. Thus Alternative D would result in beneficial impacts on water resources eligible for designation as WSRs, and the overall impact would be similar to Alternative A and between Alternatives B and C.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Each of the alternatives would result in beneficial impacts on water resources as a result of protection of wilderness characteristics (pristine, natural conditions, typically associated with high water quality).

If released by Congress, management of the WSAs would be equivalent under each of the alternatives. The management of WSAs as non-wilderness areas would include certain uses that may result in adverse impacts on water resources, such as OHV use.

Individual Effects under Alternative A

Alternative A calls for evaluating the need for BMPs (Appendix B), stipulations, and other mitigation measures on a case-by-case basis. While not very specific, any actions to protect wilderness characteristics are likely to be beneficial to water resources by not allowing, or reducing, potential sources of soil disturbance or pollution.

Until released by Congress, the 13 WSAs would be managed for protection of wilderness values, which would result in beneficial impacts on water resources. If released by Congress, the WSAs would not be managed as wilderness but would be managed for other unspecified appropriate uses. These uses probably would be determined consistent with the overall policy established under each alternative, with greater restrictions, and hence greater beneficial impacts on water, under Alternative C.

Individual Effects under Alternative B

Alternative B is less specific than Alternative A about what measures would be used to protect wilderness characteristics but is consistent with management actions identified for other resources, it is likely that use restrictions would be minimized in favor of using BMPs and other mitigation measures to reduce impacts. Therefore, risk of water resources impacts is probably higher under Alternative B than under Alternatives C and D.

Alternative B impacts would be the least beneficial after release from wilderness status.

Individual Effects under Alternative C

Alternatives C and D have the greatest potential for indirect beneficial effects on water resources because they prioritize preservation of wilderness characteristics over multiple uses.

Alternative C impacts would be the most beneficial after release from wilderness status.

Individual Effects under Alternative D

The effects from preservation of wilderness characteristics are the same as those under Alternative C. The benefit of Alternative D impacts would be between those of Alternatives B and C after release from wilderness status.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

The impacts on water resources are negligible but of the same type as those described for backcountry byways.

Individual Effects under Alternative A

There would be minor impacts on water resources resulting from visitor use. Impacts would depend on facilities.

Individual Effects under Alternative B

There would be minor impacts on water resources resulting from visitor use, similar to Alternative A. Impacts would depend on facilities.

Individual Effects under Alternative C

There would be minor impacts on water resources resulting from visitor use, but probably less than under Alternative B since Alternative C would avoid attracting increased traffic to remote areas. Impacts would depend on facilities.

Individual Effects under Alternative D

There would be minor impacts on water resources resulting from visitor use, similar to Alternative B. Impacts would depend on facilities.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

The alternatives are nearly equivalent in how they would manage environmental hazards, except that Alternative A is slightly less specific about the particular hazards that the BLM would manage.

The differences among alternatives are not consequential to the impacts on water resources. The impacts on water resources would be beneficial. Existing solid and hazardous waste sites and illegal dump sites would be identified and remediated. Remediation methods would depend on the nature of the sites. In general, these actions would be beneficial to water resources because they would address sites that present potential threats to surface or groundwater quality.

Public safety hazards would be addressed in the same way under each of the alternatives, including fencing dangerous hot springs.

Individual Effects under Alternative A

Action A-PS 5.2 would restrict the use of poisons on public land that result in a secondary killing effect, such as use of rodenticides that could poison predators.

Individual Effects under Alternative B

Action B-PS 5.2 under Alternatives B, C, and D does not call out a restriction on poisons that result in secondary killing effect since use of such poisons would be limited under the pest management program. Instead, Action B-PS 5.2 calls for maintenance of the Orovada pesticide disposal area. These actions are unrelated. Neither is expected to result in impacts on water resources.

Individual Effects under Alternative C

Impacts are similar to those under Alternative B.

Individual Effects under Alternative D

Impacts would be similar to those under Alternative B. Alternative D would provide additional law enforcement compared to the other alternatives, which may help in preventing and investigating illegal dumping, with associated potential beneficial impacts on water resources to the extent that pollution sources are reduced or responsible parties are identified.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Lands containing important wetlands or riparian wildlife habitat or other water resources would not be included in the proposed land exchanges, resulting in minor potential for impact on water quality under Alternatives B, C, and D. However, sale of lands for sustainable development may increase water use associated with that development. The amount of increase would depend on the nature of the development but could include direct impacts, ranging from increased irrigation from agricultural development to increased industrial process water use. It may include indirect impacts associated with increased demand from population growth resulting from increased economic activity.

Individual Effects under Alternative A

No impacts on water resources are expected because no land disposal actions are proposed.

Individual Effects under Alternative B

There would be an undetermined increase in water consumption, as described under Effects Common to All Alternatives, above.

Individual Effects under Alternative C

The effects would be the same as under Alternative B.

Individual Effects under Alternative D

The effects would be the same as under Alternative B.

Cumulative Effects

Increased population growth in the Carson-Truckee area is expected to result in increased demand for recreational activities. Some areas of the WDO would likely see higher use, although the WDO is too remote and has too few developed recreation facilities to attract large numbers of visitors. Therefore, if recreational development remains at a low level in the WDO, as under Alternative C, there would be little additional incentive for visitors to travel to the WDO for recreation, and they would opt for other opportunities. If, as under Alternative B, recreational facilities are developed, these facilities may attract more visitors to the WDO. Development of recreational opportunities in the WDO may also have a growth-inducing impact, because increased visitors would increase the demand for support services.

Increased demand for water in southern Nevada (Las Vegas area) has resulted in consideration by the State Engineer of transfer of water rights out of the WDO. Water rights are issued based on

estimates of the perennial yield. Many basins are already over-allocated, and the perennial yield estimates of many basins are based on relatively scant data, making them highly uncertain. The principal use of groundwater in the WDO is for irrigation, however, municipal demand is increasing and water supply is a potential limit on both urban and industrial growth in the region. The combination of increased demand outside the WDO and potentially increased demand stimulated by increased development of recreational opportunities and geothermal energy development may further limit the potential for urban growth within the WDO and force population centers to search for additional reliable water sources.

4.2.5 Vegetation—Forest/Woodland Products

Summary

Forested vegetation would be directly affected most by fire management and forest vegetation management. Restrictions on management activities for the protection of other resources, primarily cultural, visual, and special status species, would indirectly affect the level, location, and effectiveness of forest management actions to improve forest health. Effects from other resources could be limited and localized, considering the extent of forests and woodlands within the WDO.

From the standpoint of managing forest stands to maintain or improve wildlife habitat, Alternative C would provide the greatest benefit, followed by Alternatives D, A, and then B. All alternatives would allow for managing forest stands for stand health and vigor. Multiple uses would be emphasized the most in Alternative B, followed by Alternatives D, A, and C.

Methods of Analysis

Methods and Assumptions

Impacts are determined by assessing which actions, if any, would change vegetation structure or composition, would decrease the extent of forested vegetation, would allow for increased dominance of invasive weeds, would affect habitat value for wildlife species, or would decrease the potential for multiple use.

Some impacts are direct, while others are indirect and affect vegetation through a change in another resource. Direct impacts on forest and woodland vegetation are considered to include disruption, trampling, or removal of rooted vegetation, resulting in a reduction in areas of native vegetation, mortality from toxic chemicals, and actions that unequivocally reduce total numbers of plant species or reduce or cause to be lost total area, diversity, vigor, structure, or function of wildlife habitat.

Potential indirect impacts include loss of habitat suitable for colonization due to surface disturbance, introduction of noxious weeds by various mechanisms or conditions that enhance the spread of weeds, increased noise, and general loss of habitat due to surface occupancy or surface compaction. Indirect impacts include those that cannot be absolutely linked to one action, such as decreased plant vigor or health from reduced air or water quality.

The effects of each action on forest and woodland vegetation resources are quantified when possible, but many impacts must be qualitatively assessed when suitable data are not available. The following assumptions were made for this analysis:

- Current trends in plant succession and vegetation would continue;

- Noxious and invasive weeds would continue to be introduced and would spread as a result of ongoing vehicle traffic in and out of the WDO, recreational activities, wildlife and livestock grazing and their movements, and surface-disturbing activities;
- Biocontrol would continue and potentially expand;
- Noxious and invasive weeds would further expand into native plant communities, and disturbances to these communities would expand opportunities for the spread of nonnative invasive plant species; and
- Many actions that would occur within the WDO would be subject to BMPs. Although BMPs are designed to minimize the effects of projects, they generally cannot eliminate all impacts. This impact analysis assumes that BMPs would minimize but not eliminate possible effects.

Effects from Air Quality Management

Effects Common to All Alternatives

Restrictions on prescribed fire and wildfire use to protect air quality may reduce opportunities to burn in any given year. This may indirectly hinder the achievement of stand health and woodland composition goals by preventing certain forest treatments from being implemented. However, it is not expected that these restrictions would completely prevent implementation and accomplishment over the long term.

Effects from Geology Management

Effects Common to All Alternatives

Areas with geological resources are small and localized within the WDO. As a result, impacts from geology management actions on forests and woodlands, which are similarly small and localized in the planning area, would be limited.

Effects from Soil Resources Management

Effects Common to All Alternatives

Soil erosion reduction measures, involving seeding and improving vegetative cover, would reduce compaction and increase infiltration, which would indirectly improve forest health and habitat value over the short term. These impacts could become long term due to increased vegetative productivity and improved wildlife habitat and connectivity.

Individual Effects under Alternative A

Land reclamation in Alternative A would be pursued, although not required, in disturbed areas. Impacts on forests would vary depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Since this alternative places the fewest requirements on land reclamation, it could cause the greatest impact on forest and woodland vegetation. Impacts would be direct and long term.

There are no soil compaction prevention measures under Alternative A. This would indirectly impact forest and woodland vegetation, as soil compaction prevents water infiltration and therefore

may affect forest health and vigor. However, there would be no restrictions on forest treatments, which would directly facilitate forest and woodland health and habitat goals. Effects would be long term.

Individual Effects under Alternative B

Impacts from land reclamation activities relating to soil resources management under Alternative B are the same as those for Alternative A.

Soil compaction prevention measures under Alternative B would be used to mitigate adverse effects without seasonal closures. As such, forest vegetation would be indirectly impacted year-round, even during times when soils would be most susceptible to compaction. However, forest treatments could occur year-round, directly facilitating forest and woodland health and habitat goals. Effects would be long term.

Individual Effects under Alternative C

Land reclamation actions under Alternative C would have the greatest direct benefit to forest and woodland vegetation by requiring reclamation of all surface-disturbing activities. This would allow for native vegetation reestablishment and would help to achieve forest health and habitat goals in the long term.

Soil compaction prevention measures are the most stringent under Alternative C, providing for seasonal use restrictions. This would indirectly benefit forest and woodland health by preventing compaction but would limit when forest treatments could occur to achieve forest health and habitat goals. Impacts would be long term.

Individual Effects under Alternative D

Land reclamation actions under Alternative D would provide the most flexible approach to land reclamation. Impacts on forests would vary depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Impacts would be direct and long term.

Soil compaction prevention measures would include seasonal use restrictions on a case-by-case basis. Indirect impacts on forest and woodland resources include improved health and vigor from decreased soil compaction and increased infiltration. Further, such objectives as forest health and wildlife habitat could be achieved in the long term because seasonal restrictions could be less limiting to forest treatments.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Under this alternative, impacts on water resources would be reduced by complying with water quality regulations and by implementing BMPs and land health standards. This would indirectly

protect forest and woodland vegetation throughout the WDO by limiting disturbance but would provide the fewest action- and location-specific protections of all alternatives.

Individual Effects under Alternative B

Priority watershed actions would limit disturbance, indirectly protecting forest and woodland vegetation in those areas in the long term. Under this alternative, multiple uses would be allowed, which would enable forest treatments to achieve forest and woodland objectives. Impacts would be indirect, localized, and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative C

Priority watershed actions under Alternative C would provide the greatest protection of all alternatives to forests and woodlands within those areas by imposing the most restrictions. Priority watersheds would be managed as exclusion zones, which would prevent forest treatments that are incompatible with the watershed's primary use. Impacts would be indirect, localized, and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative D

Priority watershed actions would protect woodlands and forests in the long term, as described under Alternative B. Priority watersheds would be managed as avoidance areas, which may limit forest treatments in localized areas. Mitigation measures would be implemented when avoidance is not possible, which would allow for some flexibility in achieving forest and woodland product goals. Impacts would be indirect, localized, and limited by the relatively small acreage of the priority watersheds.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

In all alternatives, forest products management actions, including monitoring, establishing early warning systems for insect or disease outbreaks, and using stand treatments, would be tools to directly and indirectly improve forest health, including increased diversity in age classes and species composition, over the long term. Some forest treatments, such as mechanical control measures, would directly disturb wildlife habitat in the short term but would indirectly foster a healthier ecosystem in the long term by helping to achieve desirable stand characteristics.

Implementing SOPs (Appendix B) and mitigation measures would minimize or reduce direct and indirect impacts on woodland habitats over the long term.

Consideration of aspen, cottonwood, and mountain mahogany in implementation plans would reduce direct and indirect impacts on these species. Further, managing pinyon pine and juniper would improve stand health in these woodlands by removing unhealthy or diseased trees. These effects would be direct and long term.

Individual Effects under Alternative A

Forest management actions, including use of fire, wood product harvest, fencing, thinning, and herbicides, would efficiently achieve desirable stand characteristics and structure, thus directly

enhancing forest health and wildlife habitat value in the long term. In the short term, such actions would directly disturb wildlife habitat and would also reduce the fuel load in forests, preventing catastrophic fires that would have long-term direct effects.

Forest management for aspen, cottonwood, and mountain mahogany would help to achieve desirable stand characteristics and diversity, which ultimately would directly enhance forest health and wildlife habitat value in the long term.

Under Alternative A, pinyon and juniper woodlands would be managed for the greatest number of uses, which would help to directly achieve the multiple use objectives for forest and woodland products.

No old growth forest would be designated, but management under Alternative A would designate other stands as appropriate and would manage those actively. Management actions would be used to promote old growth characteristics, including large tree retention. Management actions to promote recruitment of large trees include mechanical or chemical treatments or use of prescribed fire. Other actions would promote old growth characteristics specific to stands, based on stand composition, structure, and function. These actions would help to directly achieve forest health goals and create higher quality wildlife habitat.

Individual Effects under Alternative B

Compared with Alternative A, Alternative B calls for more aggressive stand treatments, including fire, wood product harvest, fencing, mechanical, biological, or chemical treatments, and planting and seeding. The variety and breadth of treatment types would provide a more flexible adaptable approach to stand management. As such, Alternative B has a high likelihood to directly and efficiently achieve stand health and structure objectives.

Forest management for aspen, cottonwood, and mountain mahogany would have the same impacts as those described under Alternative A.

Pinyon and juniper woodlands would be managed for fewer uses than under Alternative A, with an emphasis on sustainable yield. Harvesting would be more intensive under Alternative B, with the potential for overharvest to directly reduce stand vigor, health, and reproductive ability.

Old growth would not be designated under Alternative B, and none would be designated in the future. Adverse impacts on stands with old growth characteristics would be avoided, but these areas would not be managed to provide old growth characteristics in the future. Alternative B is the least likely alternative to directly promote undisturbed vegetation and wildlife habitat since it does not designate old growth stands.

Individual Effects under Alternative C

Under Alternative C, fewer treatments would be allowed in forests and woodlands, with only mechanical and biological treatments allowed. Prescribed fire, wood product harvest, chemical treatments, and planting and seeding would not be used to manage stands under this alternative. As a result, Alternative C could prove to be the least effective alternative in directly achieving stand health, structure, and habitat goals. However, it also would not directly disturb wildlife habitat in the

short term. In addition, fuel load accumulation could present a fire danger and could increase the chance for a catastrophic fire.

Alternative C would manage for more species than would Alternatives A or B, which would directly produce greater diversity and stand health and more desirable wildlife habitat, compared to Alternatives A and B.

Pinyon and juniper stands would be managed only for landscape value and Native American uses. Alternative C emphasizes natural processes and little active management, indirectly preventing multiple use and sustainable yield. With less harvesting allowed in pinyon and juniper stands, there would be less direct human disturbance to wildlife habitat.

Under this alternative, 27,605 acres of old growth forest in the Pine Forest Mountains would be designated, as appropriate. This old growth designation area encompasses intermixed stands of whitebark and limber pine, mountain mahogany, and aspen. Other stands, including mountain mahogany and pinyon and juniper, would be inventoried to assess possible designation and management as old growth or to promote old growth characteristics in individual stands, as appropriate. This would preserve and maintain these forests and their wildlife habitat. However, under Alternative C, stands would not be managed for old growth characteristics, which may be less effective in directly achieving forest health and stand structure goals.

Individual Effects under Alternative D

Forest treatments, and the impacts associated with them, are similar to those described under Alternative B. However, fire management would be more adaptive because it would prioritize stands for management. As such, Alternative D would most directly and effectively achieve forest health, structure, and wildlife habitat goals.

A greater number of species would be prioritized for management, as in Alternative C. Impacts are the same as those described under Alternative C.

As under Alternative A, Alternative D includes the greatest number of uses, emphasizing multiple use and sustainable yield of forest products. Expanding wood product harvest areas, including burned stands following site stabilization, would help to directly manage stands by reducing fuel loads and stand densities and would also meet public demand for wood products. Impacts are the same as those described under Alternative A.

This alternative would designate 27,605 acres of old growth forest in the Pine Forest Mountains. This old growth designation area encompasses intermixed stands of whitebark and limber pine, mountain mahogany, and aspen. Other stands, including stands of mountain mahogany and pinyon and juniper, would be inventoried to assess possible designation and management as old growth or to promote old growth characteristics in individual stands, as appropriate. Management actions would be used to promote old growth characteristics, including large tree retention. Management actions to promote recruitment of large trees include mechanical, chemical, or biological treatments, or use of prescribed fire. Other actions would promote old growth characteristics specific to stands based on stand composition, structure, and function. As a result, forest health, structure, composition, and wildlife habitat goals in these areas would be most directly and efficiently achieved under Alternative D.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Actions to decrease weeds on BLM-administered lands would indirectly improve forest health and habitat values by increasing native species and decreasing the risk of catastrophic wildfire in both the short term and long term. Such a fire could directly damage or kill stands, indirectly allow for spread of weeds, and directly destroy wildlife habitat. Further coordination with agencies and implementation of BMPs would reduce the introduction and spread of weeds during activities. This would indirectly help achieve the goal of multiple use for forests and woodlands in the long term.

Individual Effects under Alternative A

Controlling weeds with prescribed fire would directly disturb wildlife habitat in the short term by destroying vegetation, increasing human presence, and increasing smoke. In the long term, prescribed fire use would indirectly achieve stand health, structure, composition, and wildlife habitat goals more quickly by facilitating the establishment of native vegetation. Prescribed fire is not used to control weeds over large areas, so impacts would be localized and small scale. The use of chemical and biological control methods to eradicate weeds could directly impact nontarget vegetation by causing decreased vigor or mortality in the long term.

Individual Effects under Alternative B

Impacts from weeds management actions are the same as those described under Alternative A.

Individual Effects under Alternative C

Mechanical, cultural, and biological weed treatments would be used under Alternative C, which would help to indirectly achieve forest health, composition, and wildlife habitat objectives in the long term by facilitating the establishment of native vegetation. Alternative C does not include prescribed fire as a weed management tool, which could indirectly limit effective control of saltcedar invasion in riparian woodlands because prescribed fire is one of the few effective controls of saltcedar invasion. Biological control methods could directly impact nontarget species through decreased vigor or mortality in the long term.

Individual Effects under Alternative D

Impacts from weeds management actions are the same as those described under Alternative A.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no effects common to all alternatives from chemical and biological control actions.

Individual Effects under Alternative A

Alternative A would not use IPM techniques, BMPs, and cooperation and coordination with other groups and agencies to help reduce forest pests. This could directly reduce forest health and habitat value over the short term and long term if forest pest outbreaks were to occur because pest outbreaks would decrease plant vigor or kill them.

Individual Effects under Alternative B

Use of IPM techniques, BMPs, and cooperation and coordination with other groups and agencies would help reduce forest pests and their impacts, such as stand deterioration or death. This would directly improve forest health and habitat value over the short term and long term. Using chemical and biological controls would have similar impacts on the weed management described under Alternative A.

Individual Effects under Alternative C

Use of IPM techniques, BMPs, and cooperation and coordination with other groups and agencies would help reduce forest pests and their impacts, such as stand deterioration or death. This would directly improve forest health and habitat value over the short term and long term.

Biological control methods could have impacts similar to those under Alternative A. Restriction of chemical control methods could limit the effectiveness of pest control in certain cases. No chemical control methods would be used under Alternative C. This would slow, but is not likely to completely prevent, achievement of forest health and wildlife habitat goals in the long term. However, chemical control limitations would minimize direct impacts on nontarget species, preventing inadvertent increases in stand deterioration or mortality over the long term.

Individual Effects under Alternative D

Impacts from using chemical and biological control methods are the same as those described under Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Vegetation treatments for rangeland improvement projects may reduce the prevalence of invasive species and would directly improve ecological conditions throughout a large portion of the WDO. Such projects would reestablish an understory of forbs and perennial bunchgrasses that are less susceptible to fire than invasive annuals, such as cheatgrass. This would reduce the risk of catastrophic wildfire on rangelands, which might otherwise spread into woodlands, causing direct impacts.

Individual Effects under Alternative A

CC would not be restored under this alternative, which would keep fuel loads high and would increase the risk for catastrophic fire, which could directly destroy adjacent woodlands.

Individual Effects under Alternative B

Restoration of CC would have the greatest impact in decreasing fire fuel loads and could indirectly protect adjacent woodlands from catastrophic fire in the long term.

Individual Effects under Alternative C

Option 1

Impacts on forests and woodlands from rangeland management actions are the same as those described under Alternative B.

Option 2

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would indirectly protect adjacent forests and woodlands from catastrophic fire. This would allow forest health and wildlife habitat objectives to be achieved in this area by maintaining established native vegetation.

Individual Effects under Alternative D

Impacts on forests and woodlands from rangeland management actions are the same as those described under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Improving and maintaining meadows and riparian areas could limit the type of forest treatments that could be used to achieve forest and woodland health and habitat goals. This could indirectly prevent health and habitat goals from being attained. However, these restrictions are not expected to completely prevent the attainment of these goals over the long term. The extent of riparian and wetland areas within the WDO is limited, making up less than one percent of the total land area. As such, impacts on forests and woodlands from riparian and wetland management actions would be indirect, limited and localized.

Individual Effects under Alternative A

Restoring PFC under this alternative would directly improve aspen, cottonwood, willow, alder, and chokecherry stands in riparian areas, providing for wildlife habitat in the long term. Alternative A does not quantify the amount of PFC to be achieved, so impacts would vary, depending on the extent of restoration in these communities.

Removing juniper trees from around riparian areas would directly impact multiple use and sustainable yield objectives for forests and woodlands by preventing use of juniper trees for those objectives. However, this would indirectly provide for healthier aspen, cottonwood, and other riparian woodlands by improving stand composition and diversity. This would improve stand health, composition, and wildlife habitat value in the long term.

Individual Effects under Alternative B

Restoring PFC to 60 percent by 2028 under this alternative would directly improve the composition and structure of aspen, cottonwood, willow, alder, and chokecherry stands in riparian areas, providing for healthier stands and wildlife habitat in the long term.

The impacts of juniper removal are similar to those described under Alternative A.

Individual Effects under Alternative C

The greatest amount of riparian areas and wetlands (a minimum of 85 percent by 2028) would be restored to PFC under Alternative C. As a result, direct impacts on cottonwood and aspen stands would be greatest, as described under Alternative B, and stand health and habitat value objectives likely would be achieved in the long term.

Not removing juniper from around riparian areas under Alternative C would indirectly prevent stand characteristics and structure goals from being attained. However, it would increase the extent of juniper within the WDO, allowing for increased harvest, multiple use, and sustainable yield.

Option 1

Grazing management would be used under this option to minimize impacts on forests and woodlands and riparian areas. This would directly impact aspen, cottonwood, and other riparian woodlands where livestock would be managed. Stand health and regeneration would be indirectly improved in the long term through less soil compaction and weed introduction and spread, which would compete with native vegetation. Direct improvements would occur from less vegetation utilization and trampling by livestock.

Option 2

Removing grazing from lands in the WDO would have the greatest benefit on forest and woodlands and riparian areas, as there would be no direct or indirect impacts from soil compaction, weed introduction or spread, and vegetation utilization and trampling by livestock. This would help achieve forest health and wildlife habitat objectives by eliminating grazing impacts on stand regeneration and immature trees.

Individual Effects under Alternative D

Similar to Alternative C, the greatest amount of riparian areas and wetlands (85 percent) would be progressing toward or attaining PFC by 2028. Impacts would be similar to, but slightly less than, Alternative C since Alternative D would not require achieving PFC by 2028 as long as areas were progressing toward PFC.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Modifying actions to avoid impacts on species or their habitat could directly alter forest management treatments. In some cases, this could preclude reaching management goals, such as reducing stand density or improving forest health.

Maintaining and improving lentic and lotic habitats may impact actions to cottonwood and aspen stands adjacent to these habitats. In some cases, it may allow for forest stand improvement via riparian restoration actions, but in others it may limit certain treatment options that may impact water quality (e.g., chemical). These impacts are likely to be direct and short term.

Implementing vegetation treatments to improve habitat would involve removing individual plants and altering species composition and vegetation structure. This would directly improve forest habitat, while potentially indirectly limiting multiple use goals over the long term. Some forest treatments, such as mechanical control measures, would directly disturb wildlife habitat in the short term but would foster a healthier ecosystem in the long term by improving stand diversity and structure. Mitigation measures would be required for actions near nesting migratory birds, which would allow for direct forest and woodland management and would protect migratory bird species in the long term.

Individual Effects under Alternative A

Under this alternative, actions would not prioritize habitats for protection. Lack of such protections could lead to increased soil and human disturbance, which could result in indirect impacts on woodland and forest health.

Individual Effects under Alternative B

Under this alternative, 716,528 acres of priority 2 habitat would be designated, but no priority 1 acreage would be designated. This would prioritize woodland and forest treatment areas as well, indirectly allowing for forest health and multiple use goals to be achieved in those areas in the long term.

Individual Effects under Alternative C

Under Alternative C, 1,279,481 acres of priority 1 habitat and 869,645 acres of priority 2 habitat would be designated, which would have the greatest impact of all alternatives. Impacts would be similar to, but greater than, those under Alternative B because, under Alternative C, more acreage of priority habitat would be designated.

Individual Effects under Alternative D

Under this alternative, 699,929 acres of priority 1 habitat and 1,325,967 acres of priority 2 habitat would be designated. Impacts would be greater than those under Alternative B but less than those under Alternative C because the amount of acreage designated under Alternative D would fall between those two alternatives.

Effects from Special Status Species Management

Effects Common to All Alternatives

Special status species management across all alternatives would prevent activities that would lead to listing species and would require plant inventories, sage-grouse, pygmy rabbit, bat, and raptor avoidance, and mitigation and monitoring. Such actions to avoid impacts on listed or sensitive species or their habitat could directly alter implementation or timing of vegetation management treatments. These requirements could also make forest treatments cost prohibitive. As a result, certain management goals may be precluded, such as reducing stand density or improving forest health in specific areas, but wildlife habitat would be protected. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

Management of LCT habitat could directly restrict certain vegetation treatments that would occur in adjacent riparian woodlands, such as soil disturbance or use of chemicals. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

Maintaining and improving special status species habitat would directly impact woodlands and forests by helping to achieve forest health and wildlife habitat goals in these areas.

Individual Effects under Alternative A

Restrictions on actions near nesting migratory birds, raptors, such as ferruginous hawks and goshawks, and bat habitat could directly impact forest and woodland management by limiting the type, timing, and location of stand treatments. This would prevent stand health, structure, and composition goals from being achieved. Such restrictions would also indirectly limit multiple use and sustainable yield in certain areas near special status species. However, special status species protections would help create a lower level of disturbance in forests and woodlands, providing for more desirable wildlife habitat in these areas.

Individual Effects under Alternative B

Alternative B places the least stringent restrictions on actions near nesting migratory birds, raptors, such as ferruginous hawks and goshawks, and bat habitat. However, these restrictions could still directly impact forest and woodland management by limiting the type, timing, and location of stand treatments. This would prevent stand health, structure, and composition goals from being achieved. Such restrictions would indirectly limit multiple use and sustainable yield in certain areas near special status species. However, special status species protections would help create a lower level of disturbance in forests and woodlands, providing for more desirable wildlife habitat in these areas.

Individual Effects under Alternative C

Alternative C places the greatest amount of restrictions on activities that could occur near special status species and their habitats. Of all alternatives, Alternative C would have the greatest impact on forest treatments, wildlife habitat, multiple use, and sustainable yield.

Individual Effects under Alternative D

Impacts from these actions would be similar to those described under Alternative A.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Management of wild horses and burros within HMAs and HAs could directly impact forest and woodlands by concentrating soil compaction and browsing into HMA areas. In particular, forest and woodland species, such as aspen, willow, mahogany, and alder, could be browsed and broken, especially impacting young age classes. Further, WHB concentrate under canopies for shade and compact soils in these areas. Direct impacts on vegetation include the removal of forage, which alters the amount, condition, production, and vigor of vegetation in grazed areas. Direct impacts from wild horse and burro management occur from year-long use, resulting in lower vigor of desired plant species and a change in plant species composition. Overuse of vegetation next to water sources, troughs, and stock reservoirs results in a loss of plant cover. This allows localized areas to

become dominated by invasive plants. Vegetation recovery and regeneration of woodlands on burned areas could be slowed or reduced by wild horses and burros.

Individual Effects under Alternative A

Maintaining established AMLs as a population range, using gathers when AML is exceeded, and using fertility control inhibitors would be most effective in maintaining WHB numbers within AML. This would reduce direct impacts from trampling and indirect impacts, such as soil compaction and weed spread or introduction. Impacts on forest health, stand composition, and wildlife habitat would be long term.

Converting AML between wild horse use and burro use would spread direct impacts, such as vegetation utilization, and indirect impacts, such as soil compaction, on forests and woodlands through time, as the species have different habitat and forage preferences. Maintaining the free-roaming nature of WHB would spread direct and indirect impacts geographically through the HMAs. Both actions would benefit forest health by minimizing WHB direct impacts from trampling and indirect impacts from compaction and weed spread in any given area at a certain time.

WHB protections, such as limitations to motor vehicle racing, would limit disturbance and would prevent direct and indirect forest impacts due to human use, such as trampling and litter.

Individual Effects under Alternative B

Impacts from population control measures would be similar to those described under Alternative A.

Under Alternative B, AML would not be converted between wild horse use and burro use, and WHB would not be managed primarily as free-roaming species. Both actions would impact forest health by concentrating WHB direct impacts, such as trampling, and indirect impacts, such as compaction and weed spread, within HMAs.

Protection measures for WHB would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Alternative C would control WHB populations by maintaining AML as a single number, using four-year (or longer) gather cycles, and would not allow use of fertility control inhibitors. This would cause the greatest direct and indirect impacts from WHB on woodlands and forests, but actions would still decrease the risk of soil compaction, trampling, and weed spread or introduction. Forest health, stand composition, and wildlife habitat would be impacted. However, AML reduction in response to decreased water availability for WHB would decrease direct and indirect impacts of WHB on woodlands and forests.

Impacts from converting AML between wild horse use and burro use and from maintaining the free-roaming nature of WHB would be similar to those described under Alternative A.

Protection measures for WHB would be the greatest under Alternative C and would prohibit certain activities in HMAs, such as motor vehicle racing, unless impacts were determined to be minimal. This would limit disturbance and would prevent direct and indirect forest impacts due to human use, such as trampling and litter.

Individual Effects under Alternative D

Management of contiguous HMAs, where possible, would have impacts similar to those described under Alternative C.

Impacts from population control measures and development of alternative water sources would be similar to those described under Alternative A.

Impacts from converting AML between wild horse use and burro use and from maintaining the free-roaming nature of WHB would be similar to those described under Alternative A.

Impacts from WHB protection measures would be similar to those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildfire suppression and creation of fuel breaks would prevent catastrophic destruction of woodlands and forests in these areas over the long term, which would be a direct impact. Minimum impact suppression tactics would minimize unanticipated direct effects on forest and woodland resources during fire suppression activities. In addition, emergency stabilization and rehabilitation treatments, such as seeding with native perennial species, would deter the spread of weeds and invasive species, directly and indirectly improving the composition of forests and woodlands. This helps to maintain native vegetation in woodlands and forests.

Because fire retardants are composed largely of nitrogen and phosphorus fertilizers, they may encourage growth of some species at the expense of others, resulting in direct changes in community composition and species diversity. Differential growth may also influence herbivorous behavior; both insect and vertebrate herbivores tend to favor new, rapidly growing shoots.

Fuels management actions would result in a short-term, direct loss of vegetation on a small scale. In the long term, fuel reduction projects would have direct impacts by reestablishing native vegetative communities, providing for healthy forests. These actions would allow fire to play its natural role more frequently and would reduce the likelihood of catastrophic wildfire, which would protect forest and woodland vegetation from direct destruction in the long term and over large areas.

Implementing a response to wildfires based on social, legal, and ecological consequences of the fire would protect forest resources from catastrophic fire, which would allow for forest and woodland product management objectives to be achieved.

Individual Effects under Alternative A

No additional impacts on woodlands and forests would occur as a result of wildland fire management actions under Alternative A.

Individual Effects under Alternative B

Under this alternative, 57,940 acres of forest and woodland would be designated as suitable for allowing fire for resource benefit. These areas could be more vulnerable to weed establishment and spread, having an indirect effect. However, many of these areas for allowing fire for resource benefit

are higher elevation woodland areas that have lower potential for weed invasion after burning. Allowing fire for resource benefit would be used to achieve resource goals, based on specific prescriptions under appropriate burning conditions. Further, overall woodland and forest health would benefit from allowing fire for resource benefit. The acreage designated as suitable for allowing fire for resource benefit under this alternative is large, relative to the remainder of forested vegetation in the WDO. Impacts could be long term.

Individual Effects under Alternative C

No additional impacts on woodlands and forests would occur as a result of wildland fire management actions under Alternative C.

Individual Effects under Alternative D

Under Alternative D, 5,286 acres of forest and woodland would be designated as suitable for allowing fire for resource benefit. Impacts are similar to but less than those under Alternative B because Alternative D has fewer acres designated as suitable for allowing fire for resource benefit.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Cultural inventory requirements present a considerable impact on forests and woodlands throughout the WDO. In large fire years, emergency drill seedings, where seeds are directly placed in the ground, cannot be implemented before a cultural inventory of the affected area. This can be costly and can prevent timely action during optimum seeding windows. Seeded species are then often poorly established, which indirectly increases the potential for weed spread and fire frequency. In the long term, this prevents establishment of native species.

Protections to cultural resources, such as aspen art trees and groves, would prevent direct disturbance and fragmentation of forests and woodlands. These areas are small relative to the remainder of forested vegetation in the WDO; therefore, impacts would be localized.

Site monitoring, conservation measures, use restrictions, and law enforcement actions would prevent direct and indirect disturbance to and degradation of forest and woodland habitat, while potentially impacting the ability to reach other forest and woodland vegetation goals over the long term in certain areas.

Actions to maintain and protect pinyon and juniper stands in the Stillwater Range would improve forest health, stand composition, wildlife habitat, and sustainable yield, while potentially limiting multiple use opportunities over the long term. Some forest treatments, such as mechanical control measures, would directly disturb wildlife habitat in the short term but would indirectly foster a healthier ecosystem in the long term.

Individual Effects under Alternative A

Protection of pinyon trees in the Stillwater Range would directly impact the woodland and forest multiple use goal, as Native American use would be emphasized and other uses, such as harvesting, would be restricted or prohibited in the long term. These actions would prevent disturbance and

would maintain the extent of pinyon woodland in the short term but would result in poor stand health over the long term, reducing multiple uses.

Individual Effects under Alternative B

Alternative B would afford the least amount of protection to pinyon trees in the Stillwater Range, as some harvest would be permitted. This would allow for some multiple use of woodlands and forests, although Native American use would be emphasized in the long term. These actions would also allow some disturbance and would slightly reduce the extent of pinyon woodland in the short term. Depending on how these management actions were implemented, they could indirectly or directly provide for improved forest health, composition, and structure in the long term.

Individual Effects under Alternative C

Impacts from protection of pinyon trees in the Stillwater Range are the same as those described under Alternative A.

Individual Effects under Alternative D

Impacts from pinyon tree management in the Stillwater Range are the same as those described under Alternative A, except Alternative D includes adaptive management to allow for pinyon tree harvest. This would have a slightly greater impact on multiple use and potentially on stand health objectives.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consulting with tribes to identify culturally significant plants, important habitats, and traditional use locations would emphasize protection of natural resources, including forests and woodlands. This would limit direct disturbance and foster suitable wildlife habitat over the long term in certain areas. Consultation could place higher treatment priority in areas not previously identified or limit actions in planned treatment areas. Impacts would vary on a case-by-case basis and are likely to be direct and localized.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Physical conservation measures and law enforcement actions would prevent direct disturbance to and degradation of forest and woodland habitat, while potentially impacting the ability to implement vegetation treatments over the long term in certain areas. These areas are small relative to the remainder of forested vegetation in the WDO; therefore, impacts would be direct and localized.

Effects from Visual Resources Management

Effects Common to All Alternatives

Implementing VRM guidelines, particularly managing WSAs as Class I, would increase the difficulty of accomplishing vegetation management actions and may directly affect the dimensions and locations of woodland treatments. These VRM management actions would limit the extent and effectiveness of restoration efforts, such as logging or thinning because they could change the visual

character of forests and woodlands. This would allow for undisturbed wildlife habitat in forests but would indirectly prevent forests from being treated effectively to improve forest health or species composition. Further, it may prevent multiple use and sustainable yield goals from being attained.

Individual Effects under Alternative A

Under Alternative A, 72,353 acres and 38,691 acres of forest and woodland would be managed to VRM Class I and II guidelines, respectively. These actions would limit the scope of stand treatments or prescribed burning and would prohibit treatments and prescriptions that would change the visual character. Overall, meeting VRM Class I and II guidelines would directly increase the difficulty of accomplishing forest and woodland management actions and would indirectly limit the extent or effectiveness of the management goals. This alternative would have the fewest impacts since it would be the least restrictive to forest treatment implementation.

Individual Effects under Alternative B

Under Alternative B, 70,922 acres and 58,632 acres of forest and woodland would be managed to VRM Class I and II guidelines, respectively. Impacts are similar to but greater than those described under Alternative A.

Individual Effects under Alternative C

Under Alternative C, 70,922 acres of forest and woodland would be managed to VRM Class I and 249,431 acres would be managed to VRM Class II guidelines. Impacts are similar, although greater in magnitude, than those under Alternative A.

Individual Effects under Alternative D

Under Alternative D, 70,922 acres of forest and woodland would be managed to VRM Class I and 266,401 acres would be managed to VRM Class II guidelines. Alternative D would have the greatest direct impact since it would be the most restrictive to forest treatment implementation. Impacts are similar to though greater than those under Alternative A.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

There would be no impacts on forest and woodlands from cave and karst resource management since these areas do not overlap within the WDO.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Collecting monitoring data would reveal problems with grazing management so that corrective action could be taken to improve rangelands and lower weed spread. This would, in turn, reduce the likelihood of catastrophic fire that may spread to adjacent woodlands. As such, forest and woodlands would be protected.

Individual Effects under Alternative A

Proper grazing management and range improvement actions could limit the spread of weeds into adjacent woodlands, an indirect effect, and prevent degradation of forest and woodland communities, a direct effect. Under Alternative A, 388,124 acres of forest and woodland would be open to grazing.

Riparian woodlands would be protected, preventing direct impacts, such as trampling, as well as indirect impacts, such as soil compaction and weed spread or introduction. This would maintain plant vigor, stand composition, and fire regimes.

Individual Effects under Alternative B

Impacts under Alternative B are similar to those described under Alternative A.

Individual Effects under Alternative C

Option 1

Impacts under Alternative C, Option 1 are similar to those described under Alternative A, but livestock grazing would be open on 388,071 acres of forest and woodland under this alternative.

Greater protection would be given to riparian woodlands, requiring the restoration and maintenance of biological integrity in these areas. This would have the greatest direct and indirect impacts in preventing effects through trampling, soil compaction, and weed spread or introduction and would maintain plant vigor, stand composition, and fire regimes.

Option 2

The no grazing option would eliminate a potential source of direct and indirect impacts on forest and woodland resources.

Individual Effects under Alternative D

Alternative D would have 386,130 acres of forest and woodland open to grazing. Impacts are similar to those described under Alternative A, except that fewer acres of land would be open to grazing.

Effects from Minerals Management

Effects Common to All Alternatives

General

Impacts on forest and woodland vegetation could result from fluid, leasable, and locatable mineral development and mineral material sales or disposal. Direct impacts associated with these actions would include loss of or injury to plants due to excavation or trampling, toxic responses from use of chemicals in mineral extraction or waste pits, and increased exposure to dust and other contaminants associated with construction and use of access roads. In the worst-case scenario, all vegetation would be removed from a parcel of land, and the site would be permanently altered so as to prevent future forest growth. However, most mineral development would occur in the sagebrush and salt desert scrub communities, so impacts on forests and woodlands would be limited.

Under all alternatives, BMPs would be implemented, and revegetation would be required to be concurrent with the operation, thus minimizing and mitigating impacts. Unnecessary roads would be closed to reduce fragmentation and to restore habitat. In addition, special status species habitat would be avoided, thus protecting some forest and woodland areas.

RFDs

In a reasonably foreseeable development scenario, exploration and development operations would continue and could increase impacts on forests and woodlands within the WDO.

Individual Effects under Alternative A

Alternative A would open the greatest acreage (Table 4-7) and would close the least acreage (Table 4-8) of forest and woodland to mineral development, thus having the greatest likelihood to impact forest and woodland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative B

Compared with Alternative A, Alternative B would open fewer acres (Table 4-7) and would close more acres (Table 4-8) of forest and woodland to mineral development, thus having a lower likelihood to impact forest and woodland vegetation. Impacts would be similar to those described under Effects Common to All Alternatives from Minerals Management.

Table 4-7
Forest and Woodland Acreage Open to Mineral Development

Mineral	Alternative A	Alternative B	Alternative C	Alternative D
Solid	345,507	179,233	6,856	129,374
Salable	345,373	179,233	6,752	55,028
Locatable	414,744	12,542	54,335	135,675
Fluid	335,724	179,233	6,856	129,390

Table 4-8
Forest and Woodland Acreage Closed to Mineral Development

Mineral	Alternative A	Alternative B	Alternative C	Alternative D
Solid	70,870	117,584	409,521	151,592
Salable	71,003	71,025	114,870	110,210
Locatable	1,633	1,633	71,892	1,942
Fluid	76,920	117,585	409,521	151,576

Individual Effects under Alternative C

Alternative C would open the fewest acres (Table 4-7) and would close the most acres (Table 4-8) of forest and woodland to mineral development, thus having the lowest likelihood to impact forest and

woodland vegetation of all alternatives. Impacts would be similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative D

Compared with Alternatives A and B, Alternative D would open fewer acres (Table 4-7) and would close more acres (Table 4-8) of forest and woodland to mineral development, thus having a lower likelihood to impact forest and woodland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Managing BLM-administered lands to provide dispersed recreation could impact forests and woodlands throughout the WDO through direct means, such as trampling, or indirect means, such as human disturbance, soil compaction, weed introduction or spread, and increased dust. Together, these would reduce forest and woodland health and vigor, would alter stand composition, and would lower the habitat value in these areas. Impacts would vary depending on the type of activities allowed in the area and could be short term and long term.

To manage OHV use, the Transportation Plan would be updated and would account for wildlife habitat, including forest and woodland vegetation. Site-specific NEPA analysis would be done on an implementation level to minimize impacts on forest and woodland vegetation.

Vegetation treatments may be restricted on some lands used for recreation, which would indirectly prevent the WDO from reaching its forest and woodland management goals. This could put forests and woodlands at greater susceptibility to damage from catastrophic fires. Associated impacts would be long term in certain areas.

Individual Effects under Alternative A

Under Alternative A, there would be no camping limitations or prohibitions throughout the WDO. In addition, the Pine Forest SRMA would be maintained, and issuance of special recreation permits would be the least restricted. The greatest acreage of forest and woodland (343,612 acres) would be open to OHVs under Alternative A, with the least amount of land limited (70,922 acres), and with 10,845 acres closed. Combined, these actions could have the greatest direct and indirect impacts by degrading forests and woodlands due to increased human presence, OHV use, and trail creation, which could compact soils, trample vegetation, introduce or spread weeds, disturb wildlife, and increase dust. These effects could decrease plant vigor, alter stand composition, and lower habitat value of areas throughout the WDO.

Individual Effects under Alternative B

Camping limitations and prohibitions throughout the ERMA would minimize impacts on forests and woodlands on these lands. In addition, designating three SRMAs would impact forest vegetation to varying degrees, depending on the recreation market identified for the SRMA. For example, the Nightingale SRMA would be targeted for undeveloped recreation-tourism, which would have less of an impact than Winnemucca and Pine Forest SRMAs, which allow for increased motorized vehicle

access. Under Alternative B, 26,096 acres of forest and woodland would be open to OHVs, with 10,845 acres closed and with 327,674 acres limited. Together, the direct impact from these actions is trampling of vegetation, while indirect impacts are soil compaction, wildlife disturbance, and increased dust. These impacts could decrease plant vigor, would alter stand composition, and would lower habitat value of areas throughout the ERMA, SRMAs, and OHV routes. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed.

Similar to Alternative A, issuance of special recreation permits would be the least restrictive under this alternative, which could cause some direct and indirect impacts on forests and woodlands through increased human use, trampling, weed spread, and noise disturbance. These impacts could decrease plant vigor, alter stand composition, and lower habitat value in areas.

Individual Effects under Alternative C

Camping limitations and prohibitions throughout the ERMA would minimize impacts on forests and woodlands on these lands. In addition, designation of two SRMAs would have impacts on forest vegetation similar to those described under Alternative B. Under Alternative C, no acres of forest and woodland would be open to OHVs, 9,735 acres would be closed, and 405,199 acres would be limited. In addition, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. As such, impacts from recreation actions would be fewest under this alternative, because it is the most restrictive and prohibitive. However, impacts would occur, and they are similar to those described under Alternative B.

Issuance of special recreation permits would be the most restrictive under Alternative C and would cause the fewest impacts on forests and woodlands through increased human use, trampling, litter, and noise disturbance, as described under Alternative B.

Individual Effects under Alternative D

Camping limitations and prohibitions throughout the ERMA would minimize impacts on forests and woodlands on these lands. In addition, designation of three SRMAs would have the same impacts on forest vegetation as those described under Alternative B. Under Alternative D, 180 acres of forest and woodland would be open to OHVs, 10,844 acres would be closed, and the greatest amount of land (405,298 acres) would be limited. The BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. Together, impacts from these actions are similar to those described under Alternative B.

Issuing special recreation permits would cause some direct and indirect impacts on forests and woodlands through increased human use, trampling, litter, and noise disturbance, as described under Alternative B.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Direct impacts on forest and woodland vegetation could occur with issuance of new ROWs, which require vegetation clearing and access roads and would disturb or destroy forests and woodlands.

Weed spread or introduction could be an indirect effect from ROWs, reducing forest health. However, BMPs, stipulations, and mitigation measures would be implemented, which would minimize direct and indirect impacts on forest vegetation.

Individual Effects under Alternative A

Maintaining existing exclusion areas within the WDO could limit the type and timing of treatments and multiple use activities within forests and woodlands. However, this action would protect and limit direct disturbance to forests and woodlands and would prevent indirect effects, such as weed invasion or spread caused by development.

Individual Effects under Alternative B

Designating avoidance areas within the WDO could limit the type and timing of treatments and multiple use activities within forests and woodlands. However, this action would protect and limit direct disturbance to forests and woodlands and would prevent indirect effects, such as weed invasion or spread caused by development.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones within the WDO would have the greatest impact on forests and woodlands by protecting and limiting direct disturbance to forests and woodlands and by preventing indirect effects, such as weed invasion or spread. These actions also could limit the type and timing of treatments and multiple use activities within forests and woodlands.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones within the WDO would impact forests and woodlands by protecting and limiting direct disturbance to vegetation and habitat and by preventing indirect effects, such as weed invasion or spread. However, these actions could limit the type and timing of treatments and multiple use activities within forests and woodlands.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Maintaining roads would allow access to forests and woodlands. This would indirectly help achieve forest and woodland vegetation management goals in the long term.

Noxious weed control measures would prevent the spread of weeds into forests and woodlands, would prevent competition with native species, and would indirectly help improve forest health and stand composition in the long term.

Individual Effects under Alternative A

Alternative A would have the greatest direct and indirect impact on forests and woodlands due to road and trail construction, which would cause vegetation removal, soil compaction, and increased dust. These activities would decrease forest and woodland health and vigor, would alter stand composition, and would lower habitat value in areas. Improved and increased access to stands would indirectly facilitate implementation of forest treatments and would allow for multiple uses.

Individual Effects under Alternative B

Transportation actions to minimize effects would limit direct disturbance to forests and woodlands and would prevent indirect effects, such as weed invasion or spread from road or trail construction. In the long term, this would minimize impacts on forest and woodland health and vigor, stand composition, and habitat value. However, these actions could limit access to stands for harvest management and could prevent multiple uses in certain areas.

Individual Effects under Alternative C

Transportation actions to minimize effects on forests and woodlands would have impacts similar to those under Alternative B.

Individual Effects under Alternative D

Transportation actions to minimize effects on forests and woodlands would have impacts similar to those under Alternative B.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Vegetation and wildlife habitat value would be given consideration when the WDO makes disposal and acquisition decisions. Impacts on forest and woodland vegetation would vary on a case-by-case basis, but impacts should be minimized since only lands with little resource values would be identified for disposal, and further NEPA documentation would minimize potential impacts on forests and woodlands. Acquisition of forests and woodlands would provide additional opportunities to achieve forest and woodland objectives.

ROWs alter habitat with their footprint for the facilities that are authorized. Most of the footprints are localized and cover a small area, but ROWs tend to be linear and may stretch for miles. Impacts from ROWs include permanent removal of forest and woodland vegetation, introduction and spread of weeds over large areas, and fragmentation of plant community and habitat. Many of the impacts associated with ROWs can be mitigated on a case-by-case basis.

Individual Effects under Alternative A

Issuance of ROWs would not be limited, and avoidance areas or exclusion zones for lands and realty management actions would not be designated under Alternative A. This could have the greatest direct and indirect impact on forests and woodlands from vegetation removal, soil compaction, habitat disturbance and fragmentation, and increased dust. In the long term, this would lower forest and woodland health and vigor, would alter stand composition, and would lower habitat value in areas. No restrictions would be placed on stand treatments, thus allowing for implementation of forest improvement projects.

Individual Effects under Alternative B

Designation of avoidance areas would have impacts similar to the renewable energy management actions under Alternative B. Issuance of ROWs would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones would have similar impacts as those described under Alternative C for renewable energy management actions.

Restricting ROW issuance could have the least direct and indirect impacts on forests by limiting vegetation disturbance and weed invasion or spread from road construction. This would limit impacts on forest and woodland health and vigor, stand composition, and habitat value. However, this action could limit implementation of stand improvement treatments and could prevent multiple uses in certain areas.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones would have impacts similar to those described under Alternative D for renewable energy management actions.

Issuing ROWs would have impacts similar to those described under Alternative A.

Effects from ACEC/ RNA Management

Effects Common to All Alternatives

There are no effects common to all alternatives for ACEC/RNA management.

Individual Effects under Alternative A

No impacts on forests or woodlands would occur under Alternative A because there are no forests within the Osgood Mountain Milkvetch ACEC, which is the only ACEC that would be maintained under this alternative.

Individual Effects under Alternative B

Effects from ACEC/RNA Management under Alternative B are the same as those described under Alternative A.

Individual Effects under Alternative C

Designating the Pine Forest and Stillwater ACECs would provide the greatest protection of forests and woodlands and would prevent direct disturbance and fragmentation of 46,581 acres of forested areas within these ACECs. This action could also limit multiple uses in these ACECs over the long term. The acreage of impacted forest and woodland is small relative to the remainder of forested vegetation in the WDO, so impacts would be localized.

Individual Effects under Alternative D

Effects from ACEC/RNA Management under Alternative D are the same as those described under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways may attract more tourism to areas they access and could increase human use and degradation of nearby forests and woodlands. Currently, the only BCB is the Lovelock Cave BCB, which does not access large forested areas. However, expanding BCBs could have a greater impact on forests and woodlands. Impacts would vary depending on the locations of new BCBs and areas they would access.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts from national trails management, as these actions would not affect forest or woodland product management objectives.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no effects common to all alternatives from wild and scenic rivers management.

Individual Effects under Alternative A

No WSRs would be managed under Alternative A. There would be no impacts due to the limited amount of forests and woodlands present along rivers in the WDO.

Individual Effects under Alternative B

No WSRs would be managed under Alternative B. Impacts are the same as those described under Alternative A.

Individual Effects under Alternative C

WSRs would be managed under Alternative C and would limit other uses, causing the least impact on forests and woodlands within the WDO. As a result, there would be limited impacts on riparian woodlands and habitat. Forest treatments would also be restricted, preventing management for stand health, multiple use, and sustainable yield. Impacts would be limited due to the limited amount of forests and woodlands present along rivers in the WDO.

Individual Effects under Alternative D

No WSRs would be managed under Alternative D. Impacts are the same as those described under Alternative A.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

WSAs would provide relatively undisturbed wildlife habitat in 73,879 acres of forest and woodland areas within the WDO. However, these would limit forest and woodland vegetation treatments on these lands, including in old growth stands, indirectly preventing forest and woodland goals from being achieved in the long term on these lands. Limber pine and whitebark pine stands would be most impacted by these restrictions. Wilderness and WSAs are small areas relative to the remainder of forested vegetation in the WDO; therefore, impacts would be localized.

Individual Effects under Alternative A

Wilderness characteristic areas would not be designated under Alternative A, and, as a result, there would no restrictions on forest or woodland product activities. This would indirectly allow management objectives to be achieved over the long term.

Individual Effects under Alternative B

Alternative B would manage six areas containing wilderness characteristics to meet multiple use and sustained yield objectives. This would allow management objectives to be achieved over the long term.

Individual Effects under Alternative C

As in Alternative B, Alternative C would also manage six areas containing wilderness characteristics. However, Alternative C would be the most restrictive to forest and woodland product activities within these areas, by implementing restrictions and stipulations.

Individual Effects under Alternative D

Alternative D would also manage six areas containing wilderness characteristics. Depending on the restrictions implemented, some forest and woodland uses could be limited, but restrictions are unlikely to prevent management objectives from being achieved over the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

WWV sites could impact forest and woodland vegetation by allowing for more human disturbance to the sites over the long term. Direct impacts include trampling, and indirect impacts include soil compaction, litter and noise. This could impact forest and woodland health and vigor, stand composition, and habitat value in the long term. These areas are small relative to the remainder of forested vegetation in the WDO; therefore, impacts would be localized.

Individual Effects under Alternative A

An unspecified number and location of WWV sites would be developed and maintained under this alternative. The magnitude of impacts would vary depending on the amount of WWV sites developed. Impacts are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative B

Six WWV sites would be maintained under Alternative B. Impacts would occur in these areas and are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative C

Impacts to forest and woodland would be the least under this Alternative since new routes through or near sensitive area, and increased traffic to remote areas would be avoided. This would reduce human disturbance described under Effects Common to All Alternatives. However, impacts would still occur and are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative D

Impacts are the same as those described under Alternative B.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There would be no likely impact from public health and safety management action since there are no actions that relate to forest or woodland product management objectives.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Sustainable development management actions apply to areas that have already been developed and likely do not have forests and woodland vegetation. Because sustainable development management actions would involve facility reuse, new operations would not create new disturbance. As a result, there would be few impacts on forests and woodland from sustainable development actions.

Individual Effects under Alternative A

There are no actions under Alternative A that relate to sustainable development. This could directly impact forests and woodlands by allowing degradation of vegetation or loss of lands from disposal, ROWs, or mineral operations.

Individual Effects under Alternative B

Sustainable development actions would protect sensitive habitat from disposal. This could help maintain the extent of forests and woodlands in the WDO. ROW and mineral operation actions could directly impact forests and woodlands by allowing some degradation of vegetation and lands during development. This could fragment and disturb wildlife habitat and impact forest health through soil compaction, trampling, and vegetation removal.

Individual Effects under Alternative C

Impacts would be similar to those described under Alternative B.

Individual Effects under Alternative D

Impacts would be similar to those described under Alternative B.

Cumulative Effects

Cumulative effects are similar among the alternatives. Effects on forested vegetation from any of the Winnemucca RMP alternatives would be overshadowed by reasonably foreseeable stand-replacing fire, continued fire suppression made necessary by WUI and intermingled landownership, and insect and disease outbreaks that would continue over the life of the RMP. Effects on forested vegetation from management accomplished by other landowners could affect forested vegetation on public lands. When fuels are not treated adequately, fuel hazard can increase on adjacent lands and affect fire intensity and severity on public lands.

Population increases could alter forest management, taking the emphasis off restoring wildlife habitat objectives and focusing more on fuel reduction, multiple use, and sustainable yield. These activities could result in stand structure changes but probably no species composition changes.

4.2.6 Vegetation—Weeds

Summary

The potential for weed spread would be affected most by fire and OHV management. Restrictions on management activities for the protection of other resources, primarily cultural, visual, and special status species, would affect the level, location, and effectiveness of weed management actions to reduce the potential for weed spread. Effects from other resources could be limited and localized.

The factors that most differentiate one alternative from another in terms of their potential for weed infestation are the degree to which areas are open to OHV use, the type of treatments that would be allowed within the WDO, the amount of acreage available for grazing and ground-disturbing activities. Alternative C would provide the greatest protection from weed spread, but Alternative D would provide the greatest flexibility in treating infestations. Alternatives A and B allow for more surface-disturbing activities and call for less aggressive weed treatment and avoidance overall, so these alternatives would allow for a higher potential for weed spread throughout the WDO.

Methods of Analysis

Methods and Assumptions

Effects are conditions that change the potential for weed infestation or spread. Effect determinations are based on reasonably predictable responses of weed species to a variety of conditions. Reasonably predictable responses include the following:

- Weeds often exploit disturbed areas and are adept at outcompeting many native species;
- Most actions that disturb soils or vegetation will increase the potential for weed infestation;
- Weed infestation will often follow transportation routes, making transmission corridors, roadsides, and trails prime habitat for weeds and making vehicles prime mechanisms for the spread of weeds;

- Degraded or unhealthy rangelands are particularly prone to weed infestation due to disturbances from grazing livestock; and
- Weeds thrive in ecosystems that are out of balance, either from a hydrological or vegetative perspective.

Some impacts are direct, while others are indirect and affect vegetation through a change in another resource. Direct impacts on weeds include direct removal and actions that unequivocally introduce or spread weeds.

Potential indirect impacts would result from actions that would expose or compact the soil, alter hydrologic regime or water availability, remove native vegetation, reduce the health or vigor of native vegetation (thus making it less able to compete with weeds), or create conditions that would enhance the introduction or spread of weeds.

Although many specific populations of weed species are known in the WDO, the entire area has not been inventoried. Therefore, it is difficult to predict which species, if any, may arise in a given area or to calculate the exact degree to which the WDO is affected. The analysis below focuses on explaining how existing or proposed management actions may contribute to the spread or management of weed populations. This analysis is based on the following assumptions:

- Weeds are most likely to thrive in disturbed areas, including burned areas, along road cuts or in staging areas, and where soils have been disturbed;
- Current trends in plant succession and vegetation would continue;
- Vegetation communities would be maintained with a mix of species composition, cover, and age classes;
- Changes in the potential for weed spread would occur commensurate with changes in forest management actions since logging activities contribute to extensive soil disturbance;
- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the WDO, recreational activities, wildlife and livestock grazing and their movements, and surface-disturbing activities;
- Noxious and invasive weeds would further expand into native plant communities, and disturbances to these communities would expand opportunities for the spread of nonnative invasive plant species;
- As use of BLM lands increases over the life of this RMP, levels of funding for weed control will also increase;
- Total control of the spread of noxious weeds is unlikely under any alternative;
- The BLM would continue to treat noxious and invasive weeds and pests on public land, as stipulated within other BLM permits and authorizations; and
- Weed and pest control would be carried out in coordination with the appropriate county, weed and pest control district, and owners of adjacent property.

Effects from Air Quality Management

Effects Common to All Alternatives

Restrictions on prescribed fire and wildfire use to protect air quality may reduce opportunities to burn in any given year. This may prevent certain weed treatments from being implemented and may indirectly facilitate the introduction or spread of weeds. However, these restrictions are not expected to completely prevent implementation and accomplishment over the long term.

Effects from Geology Management

Effects Common to All Alternatives

Areas with geological resources are small and localized within the WDO. As a result, impacts from geology management actions on the potential for weed spread would be limited.

Effects from Soil Resources Management

Effects Common to All Alternatives

Soil erosion reduction measures, including seeding and improving vegetative cover, would indirectly prevent the introduction or spread of weed species by helping to establish native plant species in areas that are highly susceptible to weed invasion.

Individual Effects under Alternative A

Land reclamation in Alternative A would be pursued, although not required, in disturbed areas. In addition, soil erosion reduction measures would allow for use of native or introduced species. The potential for weed spread in these areas would vary depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Impacts would be indirect and long term.

There are no soil compaction prevention measures under Alternative A. This would have the greatest indirect impact on the potential for weed spread and could prevent establishment of native vegetation, which would facilitate weed invasion. However, there would also be no restrictions on weeds treatments, which would directly reduce the potential for weed spread in invaded areas. Effects would be long term.

Individual Effects under Alternative B

Impacts from land reclamation activities relating to soil resources management under Alternative B are the same as for Alternative A. However, soil erosion reduction measures would use introduced species only, which would indirectly increase the potential for weed spread in these areas in the long term.

Soil compaction prevention measures under Alternative B would seek to mitigate adverse effects without seasonal closures. As such, native vegetation would be impacted year-round, even when soils would be most susceptible to compaction and disturbance. This could indirectly impede efforts to establish native vegetation in certain areas, as well as facilitate weed invasion or spread in the long term. However, weed treatments could also occur year-round, allowing for effective direct control of weed-infested areas in the long term.

Individual Effects under Alternative C

Land reclamation actions under Alternative C would require reclamation of all surface-disturbing activities. Soil erosion reduction measures would allow for use of native species only. This would facilitate native vegetation reestablishment and would have the greatest indirect impact in helping to prevent weed invasion or spread in the long term.

Soil compaction prevention measures are the most stringent under Alternative C, providing for seasonal use restrictions. This would benefit weed management actions indirectly by preventing soil disturbance when soils would be most susceptible, but would directly limit the timing of weed treatments in infested areas. Impacts would be long term.

Individual Effects under Alternative D

Land reclamation actions under Alternative D would provide the most flexible approach to land reclamation, and native or introduced species could be used for soil erosion reduction measures. Impacts on weed management would vary depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Impacts would be indirect and long term.

Soil compaction prevention measures would implement seasonal use restrictions, which would occur on a case-by-case basis. This would indirectly benefit weed management actions by preventing soil disturbance when soils would be most susceptible, but would directly limit the timing of weed treatments in infested areas. Impacts would be long term.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Under this alternative, priority watersheds would not be managed. However, impacts on water resources would be reduced by complying with water quality regulations and implementing BMPs and land health standards. This would indirectly protect lands from weed infestation throughout the WDO, but would provide the fewest action- and location-specific protections of all alternatives.

Individual Effects under Alternative B

Priority watershed actions would indirectly protect lands from weed infestation in the long term by imposing restrictions in these areas. Under this alternative, multiple uses would be allowed, which could increase or decrease the potential for weed spread depending on the use. Soil-disturbing activities could indirectly or directly increase weed spread or introduction through humans and machinery and could expose soil, allowing seeds to invade and outcompete native vegetation. Weed treatments could directly remove weeds and reestablish native vegetation, thus lowering the potential for weed spread. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative C

Priority watershed actions under Alternative C would provide the greatest indirect protection from weed spread or introduction in the long term for lands subject to these actions. However, as exclusion zones, they would also prevent weed treatments that are incompatible with the watershed's primary use. Impacts would vary on a case-by-case basis and would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative D

Priority watershed actions would impact weed management in the long term. As avoidance areas, they may directly limit the type of weed treatments in certain areas. Mitigation measures would be implemented when avoidance is not possible, which would allow for some flexibility in achieving weed control and eradication. This alternative would provide less protection from weed spread or invasion than Alternative C but would provide more protection compared with Alternatives B and A. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

In all alternatives, forest products management actions, including monitoring, establishing early warning systems for insect or disease outbreaks, and implementing stand treatments, are tools to monitor weed outbreaks, which would indirectly prevent weed spread or invasion over the long term.

Implementing SOPs (Appendix B) and mitigation measures would indirectly minimize or reduce weed introduction or spread over the long term by minimizing unnecessary disturbance to native vegetation.

Individual Effects under Alternative A

Actions using fire as a management tool could help to control the number and extent of weed populations in forests where weeds have invaded. Other treatments would facilitate this enhancement, including fencing, mechanical control, and herbicides. Such actions would directly reduce the spread or introduction of weeds in the long term.

No old growth forest would be designated, but management under Alternative A would designate other stands as appropriate and manage those actively. This would directly help to prevent and control weeds within these areas in the long term through early detection of weeds and prioritizing these areas for weed removal.

Individual Effects under Alternative B

Effects from forest and woodland management on vegetation are the same as those described for Alternative A. However, Alternative B calls for more aggressive stand treatments, including use of fencing, mechanical, biological, or chemical treatments, and planting and seeding. The variety and breadth of treatment types would provide a more flexible adaptable approach to stand management, including eradication of noxious and invasive species. As such, Alternative B has a high likelihood to directly and efficiently remove and prevent weed spread.

Old growth would not be designated under Alternative B, and none would be designated in the future. Adverse impacts on stands with old growth characteristics would be avoided, but these areas would not be managed to provide old growth characteristics in the future. As a result, these areas would not be given high priority for weed removal. Indirect impacts on the potential for weed spread from this action would be greatest under this alternative.

Individual Effects under Alternative C

Under Alternative C, prescribed fire would not be used to manage stands, which could prove to be the least effective at directly controlling or preventing weed infestations in the long term. In addition, fuel load accumulation could present a fire danger and increase the likelihood that native vegetation would be destroyed in a catastrophic fire. This would create conditions that favor weed invasion, causing indirect impacts. Fewer treatments would be allowed on these lands, with only mechanical and biological treatments allowed. These, too, may be less effective in lowering the potential for weed spread in the long term.

Alternative C would designate 27,605 acres of old growth forest and other stands, as appropriate. However, Alternative C would not actively manage stands for old growth characteristics, which may limit weed treatments in infested areas and thus would be less effective in directly lowering the potential for weed spread in these areas.

Individual Effects under Alternative D

Effects from forest and woodland management of vegetation are the same as those described under Alternative A. However, forest and woodland management would be more adaptive because it would prioritize stands for management. Further, the variety and breadth of treatment types would provide a more flexible, adaptable approach to stand management, including eradication of noxious and invasive species. As such, Alternative D has a high likelihood to efficiently remove noxious and invasive species and prevent their spread.

This alternative would designate 27,605 acres of old growth forest and would designate other stands as appropriate in the future. In addition, old growth stands would be managed to facilitate old growth characteristics. As a result, weed control in these areas would be prioritized and implemented most effectively under Alternative D.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Implementing weeds management actions would directly reduce the introduction and spread of noxious and invasive weeds throughout the WDO. By increasing the amount of native vegetation, the risk of catastrophic wildfire would be decreased in both the short term and long term. Such a fire could damage or kill native vegetation, which would allow for the continued spread of weeds, causing indirect impacts.

Individual Effects under Alternative A

Using a variety of control methods would be the most direct, effective, and adaptable approach in controlling the introduction and spread of noxious weeds. However, lack of education programs,

implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, or new techniques could indirectly limit the effectiveness of weed management actions in the long term.

Individual Effects under Alternative B

Using a variety of control methods would have the same effects as those under Alternative A. In addition, education programs, implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, and use of new techniques would indirectly supplement the effectiveness of weed management actions in the long term by providing a more comprehensive approach to weed control.

Individual Effects under Alternative C

Alternative C would use the fewest control methods, which would limit the effectiveness of direct weed management in the long term. However, education programs, implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, and use of new techniques would indirectly supplement the effectiveness of weed management actions in the long term by providing a more comprehensive approach to weed control.

Individual Effects under Alternative D

Using a variety of control methods would have the same direct effects as those described under Alternative A. Similar to Alternative B, education programs, implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, and use of new techniques would indirectly supplement the effectiveness of weed management actions in the long term by providing a more comprehensive approach to weed control.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Using chemical control methods would directly help to control and reduce weed outbreaks.

Individual Effects under Alternative A

Restricting herbicide use near water would directly limit the effectiveness of weed treatments in riparian areas. This is especially restrictive, as current weed outbreaks often occur near water and are treated with chemicals.

Lack of regulation regarding the types of biological and chemical control and how to implement control methods could lead to ineffective and unsafe weed management practices.

Individual Effects under Alternative B

Using both biological and chemical control methods, as well as IPM techniques, would provide a direct, adaptive, and effective approach to weed management in the long term. Preparing pesticide and biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO.

Individual Effects under Alternative C

The focus on biological control methods would limit the effectiveness of direct weed management in the long term under Alternative C. However, use of IPM techniques would provide a direct, adaptive, and effective approach to weed management in the long term. Preparing pesticide and biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO.

Individual Effects under Alternative D

Effects from chemical and biological control are the same as those described under Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Vegetation treatments for range improvement projects would directly cause a short-term increase in the prevalence of invasive species during construction but would lead to a long-term reduction by helping to achieve an improved ecological condition throughout a large portion of the WDO. Such projects would have indirect effects by reestablishing an understory of forbs and perennial bunchgrasses that are less susceptible to fire than invasive annuals, such as cheatgrass. This would reduce the risk of catastrophic wildfire on rangelands, which would prevent the continued spread of weeds.

Individual Alternative Effects from Vegetation—Rangeland Management

Individual Effects under Alternative A

CC would not be restored under this alternative. This would have indirect effects by keeping fuel loads high and increasing the risk for catastrophic fire, which could destroy native vegetation and allow for the spread or introduction of invasive weeds.

Individual Effects under Alternative B

Land treatments and restoration of CC would lower fire fuel loads and would partially focus on direct weed control, including cheatgrass and other exotic annuals, to reduce the fire threat. A short-term direct effect would occur in the form of increased potential for weed spread in treated areas due to increased soil disturbance and increased use of vehicles that could introduce or spread weed seeds. A long-term indirect impact would occur in the form of decreased potential for weed spread in treated areas due to less frequent or less intense fires and an increased prevalence of native vegetation.

Individual Effects under Alternative C

Option 1

Impacts on the potential for weed spread from rangeland management actions are the same as those described under Alternative B.

Option 2

The no grazing option could indirectly reduce the potential for weed spread by removing livestock, which are weed seed sources, and allowing native vegetation to reestablish throughout the WDO in the long term.

Restoring CC to Class II levels on 70,000 acres would have indirect effects by reducing fuel loads on these lands and protecting native vegetation from catastrophic fire. This would prevent weed invasion in the native vegetation in the long term.

Individual Effects under Alternative D

Impacts on the potential for weed spread from rangeland management actions are similar to those described under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Improving and maintaining meadows and riparian areas would involve weed removal, causing a direct effect. However, riparian and wetlands protection could limit the type of weed treatments (e.g., chemical) that could be used to contain and eliminate weeds in riparian areas. These restrictions are not expected to completely prevent weed removal over the long term.

Riparian and wetland areas within the WDO cover less than one percent of the total land area. As such, impacts on weed infestation from riparian and wetland management are limited and localized.

Individual Effects under Alternative A

Weed infestation can be sufficient to cause poor function in riparian zones, by reducing vegetative and canopy diversity and structure and by altering fire regimes and water retention rates. Thus, restoring PFC under this alternative would require reducing the extent of weeds in infested riparian and wetland areas, causing a direct effect in the long term.

Individual Effects under Alternative B

Restoration of PFC to 60 percent by 2028 under this alternative would require reducing the extent of weeds in infested riparian and wetland areas, causing a direct effect in the long term, which is similar to Alternative A.

Individual Effects under Alternative C

The greatest amount of riparian areas and wetlands (a minimum of 85 percent by 2028) would be restored to PFC under Alternative C. As a result, the number and extent of weed populations would be reduced in the long term, having a direct effect.

Option 1

Grazing management would be used in this option to minimize impacts on riparian areas and wetlands. Impacts include less soil disturbance, an indirect effect, and less weed spread or introduction, which would be a direct effect in the long term.

Option 2

Removing grazing from lands in the WDO would have the greatest benefit on riparian areas and wetlands because there would be no direct or indirect impacts from soil disturbance, weed spread or introduction, and trampling of native vegetation by livestock. This would be most effective in lowering the potential for weed spread in the long term.

Individual Effects under Alternative D

Restoring PFC under this alternative would have impacts similar to but slightly less than those described under Alternative C. This is because Alternative D would not require restoration of PFC by 2028, as long as areas were progressing toward PFC. As such, it could take longer to reduce weeds under Alternative D.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Modifying actions to avoid impacts on species or their habitat could alter the location and timing of weed treatments, possibly precluding weed control or eradication in localized areas, causing a direct effect over the long term.

In some cases, maintaining and improving lentic and lotic habitats would allow for habitat improvement by control of weeds. In other cases, these actions may limit certain treatment options that could impact water quality (e.g., chemical). These impacts are likely to be direct and short term.

Implementing vegetation treatments to improve habitat would involve directly removing weed species. Mitigation measures would be required for actions near nesting migratory birds, which would allow for weed management and would protect migratory bird species in the long term.

Individual Effects under Alternative A

Under this alternative, actions would not prioritize habitats for protection. Lack of such protections could lead to increased soil disturbance from human use and access, which would increase the potential for weed spread, an indirect impact.

Individual Effects under Alternative B

Under this alternative, no acres of priority 1 habitat and 716,528 acres of priority 2 habitat would be designated. This would prioritize weed treatment areas, allowing for a more efficient and effective weed control strategy, having an indirect effect in the long term.

Individual Effects under Alternative C

Under Alternative C, 1,279,481 acres of priority 1 habitat and 869,645 acres of priority 2 habitat would be designated. Designating priority habitats would prioritize weed treatment areas, which would be an indirect effect. Because Alternative C would designate the greatest area of priority 1 habitat, this would allow for the most efficient and effective weed control strategy in the long term.

Individual Effects under Alternative D

Under this alternative, 699,929 acres of priority 1 and 1,325,967 acres of priority 2 habitat would be designated. Designating priority habitats would prioritize weed treatment areas, indirectly allowing for a more efficient and effective weed control strategy in the long term.

Effects from Special Status Species Management

Effects Common to All Alternatives

Special status species management across all alternatives would prevent activities that would lead to listing of species and would require plant inventories, sage-grouse, pygmy rabbit, bat, and raptor avoidance, and mitigation and monitoring. Such actions to avoid impacts on listed or sensitive species or their habitats could alter implementation or timing of weed management treatments. This could indirectly preclude effective weed control or eradication over the long term. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

Management of LCT habitat could restrict certain weed treatments that would occur in adjacent riparian areas, such as those involving soil disturbance or use of chemicals. Impacts would be direct and would vary with the type of treatment proposed and with the nature and extent of the restrictions.

Maintaining and improving special status species habitat would increase native plant vegetation, which would be an indirect effect. Increases in and improvement of native vegetation would make the habitat more resilient to infestation by invasive nonnative species in the long term.

Individual Effects under Alternative A

Restrictions on actions near special status plants, sage-grouse habitat and sage-grouse leks, pygmy rabbits, bat habitat, and raptors could impact weed management by limiting the type, timing, and location of vegetation manipulation or chemical application actions used in the treatment of weeds. This could indirectly prevent effective control of noxious and invasive weeds. However, special status species protections would help create a lower level of disturbance in certain areas, providing for less human use and soil disturbance and lower the potential for weed spread in the long term, which would be an indirect effect.

Individual Effects under Alternative B

Alternative B places the least stringent restrictions on actions near special status plants, sage-grouse habitat and sage-grouse leks, pygmy rabbits, bat habitat, and raptors. However, these restrictions could still impact weed management by limiting the type, timing, and location of weed treatments in weed-infested areas. However, special status species protections would also prevent impacts from soil disturbance and human use, thus lowering the potential for weed spread in certain areas. Impacts would be indirect and would vary on a case-by-case basis, depending on the level of weed infestation and the potential for weed spread.

Individual Effects under Alternative C

Alternative C places the greatest amount of restrictions on activities that could occur near special status species and their habitats. Of all the alternatives, Alternative C would have the greatest impact

on weed treatments in infested areas but also would limit the potential for weed spread in undisturbed areas, causing indirect effects.

Individual Effects under Alternative D

Impacts from these actions are similar to those described under Alternative A.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Wild horses and burros are sources that can increase the potential for weed spread in an area. As such, management of wild horses and burros within HMAs and HAs could directly increase the potential for weed spread in the HMAs. Browsing and trampling by WHB impacts vegetation by removing native species. Trampling leads to soil compaction, which indirectly affects the vigor of desired plant species. The result is a landscape dominated by invasive species. Overuse of vegetation adjacent to water sources, troughs, and stock reservoirs results in a loss of plant cover. This indirectly allows localized areas to become dominated by invasive plants. Native vegetation recovery on burned areas could be slowed or reduced by wild horses and burros, thus indirectly allowing for weed invasion.

Individual Effects under Alternative A

Continuing established AMLs as a population range, using gathers when AML is exceeded, and using fertility control inhibitors would be the most effective methods of maintaining WHB numbers within AML. This would indirectly reduce the impact of WHB on weed management by keeping WHB within sustainable population numbers. However, developing alternate waters for WHB would concentrate WHB use in an area and could indirectly increase the spread of weeds in places that may not have been frequented by WHB in the past through soil compaction and disturbance of native vegetation.

WHB protections, such as limitations on motor vehicle racing, would directly prevent weed spread due to human use.

Individual Effects under Alternative B

Impacts from population control measures are similar to those described under Alternative A.

Protection measures for WHB would have similar impacts as those under Alternative A.

Individual Effects under Alternative C

Alternative C allows AML to be set and referenced as a single number, which would not account for the desired gather cycle, based on the population growth over time. Further, fertility control inhibitors would not be allowed. Thus, populations under this alternative would likely exceed AML more frequently than under the other alternatives, and it could increase weeds, especially over the long term, due to additional hoof impacts on soils and utilization of desired vegetation. However, AML reduction in response to decreased water availability for WHB would decrease potential weed impacts from WHB. Impacts would be indirect.

Protection measures for WHB would be the greatest under Alternative C and could prohibit or limit certain ground-disturbing activities in HMAs. This may be effective in directly preventing weed spread caused by ground disturbance and weed seed transport.

Individual Effects under Alternative D

Impacts from population control and development of alternative water sources are similar to those described under Alternative A.

Impacts of converting the land between wild horse use and burro use are similar to those described under Alternative A.

Impacts from WHB protection measures are similar to those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Under any wildfire control scenario, suppression activities and fuels treatment actions could spread weed seeds or create conditions, such as soil disturbance, that favor weeds. Striving for control status in one operational period would require an aggressive suppression response that may result in greater soil disturbance or use of vehicles than other less aggressive methods. This higher level of disturbance and higher number of vehicles would lead to greater potential for weed spread, an indirect effect. Areas that are already affected by species that thrive in post-burn conditions, such as cheatgrass, may experience a long-term increase in the potential for weed spread as a result of allowing fire for resource benefit.

However, wildfire suppression and creation of fuel breaks would prevent catastrophic destruction of native vegetation, which would indirectly prevent weed invasion in these areas over the long term. Minimum impact suppression tactics would minimize unanticipated effects on native vegetation during fire suppression activities. In addition, emergency stabilization and rehabilitation treatments, such as seeding with native perennial plant species, indirectly deter the spread of weeds and invasive species.

Because fire retardants are composed largely of nitrogen and phosphorus fertilizers, they may encourage growth of some species, particularly weeds, at the expense of others, indirectly resulting in changes in community composition and species diversity. Differential growth may also influence herbivorous behavior; both insect and vertebrate herbivores tend to favor new rapidly growing shoots.

Fuels management actions would result in a direct, short-term loss of vegetation, both native and invasive, on a small scale. In the long term, fuel reduction projects would reestablish native vegetative communities, thus indirectly lowering the potential for weed spread. These actions would allow fire to play its natural role more frequently and would reduce the likelihood of catastrophic wildfire, which would protect native vegetation in the long term and over large areas, having an indirect effect on weed management.

Implementing a response to wildfires based on social, legal, and ecological consequences of the fire would protect areas susceptible to invasion, which would be an indirect effect, and would treat

weed-infested areas, which would be a direct effect. This would reduce the potential for weed spread in certain areas over the long term.

Individual Effects under Alternative A

No additional impacts would occur from wildland fire management actions under Alternative A.

Individual Effects under Alternative B

Under this alternative, 110,167 acres of land would be designated as suitable for allowing fire for resource benefit. These areas could be more vulnerable to weed establishment and spread, as described under Effects Common to All Alternatives. However, these areas where fire would be allowed for resource benefit are generally higher elevation woodland areas that have lower potential for weed invasion after burning. As a result, and considering the small acreage of land affected, impacts would be indirect and limited.

Individual Effects under Alternative C

Alternative C would not allow prescribed fire or chemical fuel treatments, and as a result, weed control would be more difficult and less effective under this alternative. This would indirectly increase the potential for weed spread in the short term.

Individual Effects under Alternative D

Under Alternative D, 9,932 acres of land would be designated as suitable for allowing fire for resource benefit. Impacts are similar to but less than those under Alternative B because Alternative D has fewer acres designated as suitable for allowing fire for resource benefit.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Protecting cultural resources, such as aspen art trees and groves, would prevent disturbance and fragmentation of native vegetation, thus indirectly lowering the potential for weed spread. These areas are small relative to the remainder of forested vegetation in the WDO, so impacts would be localized.

Site monitoring, conservation measures, use restrictions, and law enforcement would prevent disturbance to and degradation of native vegetation, while potentially directly impacting the ability to implement weed treatments over the long term in certain areas.

Individual Effects under Alternative A

Protecting pinyon trees in the Stillwater Range could directly prohibit certain weed management treatments such as chemical control in that area, which may have adverse effects on nontarget species. However, these actions also would minimize soil-disturbing activities, which would indirectly lower the potential for weed spread in the long term.

Individual Effects under Alternative B

Alternative B allows some pinyon trees in the Stillwater Range to be harvested. This would allow more soil disturbance and human use of the area, which could directly introduce and spread weeds and would indirectly increase the potential for weed spread in the long term. However, this action would place the fewest restrictions on weed treatments in infested areas, facilitating direct, efficient, and effective control and eradication.

Individual Effects under Alternative C

Impacts from protecting pinyon trees in the Stillwater Range are the same as those described under Alternative A.

Individual Effects under Alternative D

Impacts from protecting pinyon trees in the Stillwater Range are the same as those described under Alternative A, except Alternative D includes adaptive management to allow for some pinyon tree harvest. This would have slightly greater direct and indirect impacts on the potential for weed spread by introducing soil-disturbing activity and increased human use, as described under Alternative B.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consulting with tribes to identify culturally significant plants, important habitats, and traditional use locations emphasizes protection of natural resources, including reestablishing native vegetation and eradicating weeds, which would have both indirect and direct effects. This also would limit soil-disturbing activities in certain areas, thereby indirectly preventing weed introduction. Consultation could place higher treatment priority on areas not previously identified or could limit actions in planned treatment areas. Impacts would vary on a case-by-case basis and are likely to be localized.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Physical conservation measures and law enforcement actions would prevent disturbance to and degradation of lands, which would indirectly deter the spread or introduction of weeds into these areas. These actions also could impact the ability to implement weed treatments over the long term in certain areas, which would be a direct effect. These areas are small relative to the size of the WDO, so impacts would be localized.

Effects from Visual Resources Management

Effects Common to All Alternatives

Weed expansion can be seen partially as a function of the amount of acreage in various VRM categories. In general, alternatives that have more acres in VRM Classes I and II have lower potential for weed spread than those that have more acres in VRM Classes III and IV. This is because soil surface disturbance is minimized in Class I and II areas. As such, implementing VRM guidelines, particularly managing WSAs as Class I areas, would directly lower the potential for weed spread within the WDO.

Individual Effects under Alternative A

Under Alternative A, 420,271 acres and 346,302 acres would be managed to VRM Class I and II guidelines, respectively. This would directly reduce the potential for weed spread, as described under Effects Common to All Alternatives from Visual Resources Management.

Individual Effects under Alternative B

Under Alternative B, 417,605 acres and 391,203 acres would be managed to VRM Class I and II standards, respectively. This would directly reduce the potential for weed spread, as described under Effects Common to All Alternatives from Visual Resources Management. Alternative B would manage for the fewest acres of VRM Class I and II and therefore would be the least effective of the all alternatives in reducing the potential for weed spread.

Individual Effects under Alternative C

Under Alternative C, 417,605 acres and 3,083,858 acres would be managed to VRM Class I and II standards, respectively. This would cause the greatest direct reduction in the potential for weed spread, as described under Effects Common to All Alternatives from Visual Resources Management.

Individual Effects under Alternative D

Under Alternative D, 417,605 acres and 2,780,416 acres would be managed to VRM Class I and II standards, respectively. Impacts would be slightly less than but are similar to those described under Alternative C.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

There would be no likely impacts on weed management from cave and karst resource management.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Collecting monitoring data would allow problems to be detected so that corrective action could be taken to improve rangelands and lower weed spread. Healthy rangelands have a lower abundance of cheatgrass and noxious weeds, which promote fire spread. This would, in turn, reduce the likelihood of catastrophic fire that may destroy native vegetation, making large areas more susceptible to weed invasion. As such, native vegetation and wildlife habitat would be protected, which would indirectly prevent weed invasion.

Individual Effects under Alternative A

Livestock grazing would be open on 8,232,727 acres of land under this alternative, which would have the greatest impact on weed management. Improper grazing would directly and indirectly facilitate weed spread and introduction, as seeds are transported on livestock and degraded rangeland that is grazed yearly lacks substantial native vegetation to outcompete invaders.

The potential for weeds would be lower on lands closed to grazing on the remainder of the land within the WDO. This is because livestock would not be a mechanism for seed dispersal.

Grazing on riparian areas would be reduced or excluded, thereby preventing direct impacts through weed introduction, or indirect impacts, such as soil compaction and trampling of native vegetation.

Individual Effects under Alternative B

Similar to Alternative A, livestock grazing would be open on 8,232,727 acres of land under this alternative. Grazing, including grazing on acquired lands, allowing temporary nonrenewable use, and allowing continuous season-long use would directly and indirectly facilitate weed spread and introduction to the greatest extent. This is because seeds are transported on livestock, and degraded rangeland that is grazed continuously lacks substantial native vegetation to outcompete invaders.

Range improvement actions and prescribed grazing have impacts similar as those described under Alternative A.

The potential for weeds would be lower on lands closed to grazing on the remainder of the land within the WDO. This is because livestock would not be a mechanism for seed dispersal, and the land could recover from impacts with native vegetation.

Individual Effects under Alternative C

Option 1

Livestock grazing would be open on 8,038,084 acres of land under this alternative. Grazing would directly and indirectly facilitate weed spread and introduction, and the effects would be similar to those described under Alternative A, although fewer acres are open under Alternative C, Option 1. However, Alternative C, Option 1 would not allow grazing on acquired lands or temporary nonrenewable use and would allow only two years of consecutive grazing during the critical growth period. This would minimize the potential for weed spread by reducing the amount of land subject to grazing and the grazing intensity.

Lands closed to grazing on the remainder of land within the WDO would lower the potential for weed spread in these areas because livestock would not be a mechanism for seed dispersal, and land could recover from impacts with native vegetation.

Range improvements would be somewhat more restricted compared to the other alternatives and could limit the type, timing, and location of weed treatments, causing direct effects. Prescribed grazing would be used to lower the potential for weed spread, as described under Alternative A.

Greater protection would be given to riparian areas, causing improvement in functionality or changes in plant communities to meet the riparian standards. This would prevent direct impacts through trampling and indirect impacts from soil compaction and weed spread or introduction and would maintain plant vigor, stand composition, and natural fire regimes.

Option 2

Livestock grazing would be closed on all lands within the WDO, which would have the greatest direct and indirect impact on reducing the spread of weeds due to livestock on BLM-administered lands.

Impacts from range and riparian improvement actions are similar to those described under Alternative C, Option 1.

Individual Effects under Alternative D

Under Alternative D, 8,016,754 acres of land would be open to grazing. Impacts are similar to those described under Alternative A, except that the fewest acres of land would be open to grazing compared to the other alternatives.

Impacts from range improvements are similar to those described under Alternative B.

Protection would be given to riparian woodlands, preventing direct impacts through weed introduction and indirect impacts, such as soil compaction and trampling of native vegetation.

Effects from Minerals Management

Effects Common to All Alternatives

General

Exploration and development operations associated with fluid, leasable, and locatable mineral development, mineral material sales, and mineral disposal typically disturb some level of vegetation. These disturbances directly result in increased potential for weed spread, including import and export of weed seeds. Under all alternatives, BMPs would be implemented and revegetation concurrent with the operation would be required, reestablishing native vegetation and indirectly preventing weed spread.

RFDs

In a reasonably foreseeable development scenario, exploration and development operations would continue and could increase the potential for weed spread throughout the WDO. These developments would also have indirect effects by fragmenting native vegetative communities, making them increasingly susceptible to weed invasion.

Individual Effects under Alternative A

Alternative A would open the greatest acreage and would close the least acreage to mineral development, thus having the greatest likelihood to impact the potential for weed spread. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative B

Compared with Alternative A, Alternative B would open fewer acres and would close more acres to mineral development, thus having a lower likelihood to impact the potential for weed spread.

Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative C

Alternative C would open the fewest acres and would close the most acres to mineral development, thus having the least likelihood to impact the potential for weed spread of all alternatives. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative D

Compared with Alternatives A and B, Alternative D would open fewer acres and would close more acres to mineral development, thus having a lower likelihood to impact the potential for weed spread. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Recreational activities can introduce and spread noxious and invasive weed seeds from vehicles, shoes, clothing, and recreational equipment. As recreation use increases, visitors from outside the area could bring in noxious and invasive weeds, including new invasive species. Recreation activities that occur in undisturbed and remote areas could distribute weed seeds into weed-free areas. Impacts could be direct and long term and could take place over a large area.

To manage OHV use, the Transportation Plan would be updated and would account for weed spread. Site-specific NEPA analysis would be done on an implementation level to minimize impacts from weeds.

Individual Effects under Alternative A

Under Alternative A, there would be no camping limitations or prohibitions in the WDO. In addition, the Pine Forest SRMA would be maintained, and issuance of special recreation permits would be the least restricted. The greatest acreage (6,782,790 acres) would be open to OHVs under Alternative A, with the least amount of land (416,652) limited and with 24,832 acres closed. The combination of these actions would make lands susceptible to increased human presence, OHV use, and trail creation throughout the WDO. This alternative would cause the greatest indirect increase in the potential for weed spread, such as by increasing soil and vegetation disturbance. Direct impacts would occur from increasing potential weed seed sources.

Individual Effects under Alternative B

Camping limitations and prohibitions throughout the ERMA would directly reduce the potential for weed spread on these lands by restricting humans and vehicles, both of which are mechanisms for weed seed dispersal. In addition, designation of three SRMAs would impact the potential for weed spread to varying degrees, depending on the recreation market identified for the SRMA. For example, the Nightingale SRMA would be targeted for undeveloped recreation-tourism. This would have less of an impact than Winnemucca and Pine Forest SRMAs, which allow for increased

motorized vehicle access. Under Alternative B, 1,460,200 acres would be open to OHVs, with the least amount of land (24,832 acres) closed and 5,445,218 acres limited. Together, these actions cause indirect effects, such as soil disturbance and trampling of native vegetation, as well as direct effects, such as increased mechanisms for weed seed dispersal. These impacts could increase the potential for weed spread throughout the ERMA, SRMAs, and OHV routes. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed.

Issuing special recreation permits would be the least restricted under this alternative, which could directly and indirectly increase the potential for weed spread through increased human use, trampling of native vegetation, and soil disturbance.

Individual Effects under Alternative C

Camping limitations and prohibitions throughout the ERMA would have impacts similar to those described under Alternative B. In addition, designation of two SRMAs would have impacts on the potential for weed spread similar to those described under Alternative B. Under Alternative C, no acres would be open to OHVs, 61,427 acres would be closed, and 7,143,177 acres would be limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. Impacts from recreation would be fewest under this alternative because it is the most restrictive and prohibitive. Impacts would occur, however, and they would be similar to those described under Alternative B.

Issuing special recreation permits would be the most restrictive under Alternative C and would cause the fewest direct and indirect impacts on weed management through increased human use, trampling of native vegetation, and soil disturbance.

Individual Effects under Alternative D

The impacts from camping limitations and prohibitions throughout the ERMA would be similar to those described under Alternative B. In addition, designating three SRMAs would have the same impacts on weed management as those described under Alternative B. Under Alternative D, 289,932 acres would be open to OHVs, with 35,483 acres closed and 6,878,592 acres limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. Together, impacts from these actions would be similar to, but less than, those described under Alternative B.

Issuance of special recreation permits would cause some impacts similar to those described under Alternative A.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Developing renewable energy projects could directly introduce weed seeds or produce soil disturbance that indirectly favors weeds. Developing such projects may include issuing ROWs, constructing staging areas for chippers or other heavy equipment, and constructing access roads that could disturb soils and vegetation. As a result, the potential for weed spread would increase in these

areas. BMPs, stipulations, and mitigation measures would be implemented, which would minimize the spread or introduction of weeds from renewable energy projects.

Individual Effects under Alternative A

Maintaining existing exclusion areas within the WDO could limit the type and timing of weed treatments to prevent weed spread and introduction. However, this action would also protect and limit disturbance to soils and vegetation, thereby indirectly lowering the potential for weed spread.

Individual Effects under Alternative B

Designating avoidance areas within the WDO could limit the type and timing of weed treatments to prevent weed spread and introduction. However, this action would also protect and limit disturbance to soils and vegetation, thereby indirectly lowering the potential for weed spread.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones within the WDO could have the greatest impact in limiting the type and timing of weed treatments to prevent weed spread and introduction. However, this action would also afford the greatest protection to soils and vegetation, thereby causing the greatest reduction in the potential for weed spread.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones within the WDO would have similar impacts on weed management as those described under Alternative C.

Effects from Transportation and Access Management

Effects Common to All Alternatives

OHV users would directly introduce and spread noxious and invasive weed seeds from their vehicles, shoes, clothing, and recreational equipment. As OHV use increases, visitors from outside the area could bring in noxious and invasive weeds, including new invasive species. OHV activities in undisturbed and remote areas could distribute weed seeds into weed-free areas.

Other types of travel, including by foot, horse, or bike, cause fewer impacts, although all could disturb soils, causing indirect effects, or allow for weed seed transport, which would be a direct effect. Horses in particular have a high capacity for introducing weed seeds from manure into previously unaffected areas. Groups of horses may also create soil and vegetation disturbance in areas where they are tethered overnight, increasing the potential for weed spread in confined areas.

Noxious weed control measures would directly prevent the spread and introduction of weeds along roads, as well as prevent weed competition with native species.

Individual Effects under Alternative A

The potential for weed spread could increase from road and trail construction via indirect means, such as vegetation removal and soil compaction, as well as direct means, such as seeds being transported by vehicles.

Individual Effects under Alternative B

Transportation actions that minimize effects and limit disturbance to native vegetation and soils and would directly prevent weed invasion or spread from road or trail construction or from transport on vehicles.

Individual Effects under Alternative C

Transportation actions that minimize effects would have impacts similar to those described under Alternative B.

Individual Effects under Alternative D

Transportation actions that minimize effects are similar to those described under Alternative B.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Noxious and invasive weeds would be given consideration when the WDO makes disposal and acquisition decisions, though the presence of invasive species would not considerably affect these decisions. As a result, weed spread or introduction to BLM-administered lands would vary on a case-by-case basis, but impacts should be minimized since lands with little resource values would be identified for disposal, and further NEPA documentation would consider the potential for weed spread resulting from proposed actions.

ROWs alter habitat with their footprint for the facilities that are authorized. Most of the footprints are localized and cover a small area, but ROWs tend to be linear and may stretch for miles. If disturbed areas are not properly reseeded with native vegetation, weeds could be introduced and spread over a large area.

Individual Effects under Alternative A

Issuance of ROWs would not be limited, and avoidance areas or exclusion zones for lands and realty management actions would not be designated under Alternative A. This would increase the potential for weed spread by allowing for increased soil disturbance and vegetation removal, access to previously inaccessible areas, and weed transport on vehicles.

Individual Effects under Alternative B

Designating avoidance areas has impacts similar to the renewable energy management actions under Alternative B.

The impacts from issuing ROWs are similar to those described under Alternative A.

Individual Effects under Alternative C

Impacts from designating avoidance areas and exclusion zones are similar to the renewable energy management actions under Alternative C.

Restricting ROW issuance would decrease the potential for weed spread by limiting soil disturbance and vegetation removal, access to previously inaccessible areas, and weed transport on vehicles.

Individual Effects under Alternative D

The impacts from designating avoidance areas and exclusion zones are similar to the renewable energy management actions under Alternative D.

The impacts from issuing ROWs are similar to those described under Alternative A.

Effects from ACEC/ RNA Management

Effects Common to All Alternatives

There would be no effects common to all alternatives from ACEC/RNA management.

Individual Effects under Alternative A

Maintaining the Osgood Mountain Milkvetch ACEC would protect native vegetation and would prevent disturbance of areas within the ACEC. This action would limit the potential for weed spread because habitat improvement for the species consists of weed eradication. However, implementation of certain weed treatments could be limited in areas, depending on habitat sensitivity. This ACEC is small relative to the total area of the WDO, so impacts would be localized.

Individual Effects under Alternative B

The effects from ACEC/RNA Management under Alternative B are the same as those under Alternative A.

Individual Effects under Alternative C

Designating four ACECs within the WDO would provide the greatest protection to native vegetation and would prevent disturbance of areas within these ACECs. This action would limit the potential for weed spread in these areas. However, implementing certain weed treatments could be limited in areas, depending on habitat sensitivity. The acreage of the four ACECs (97,584 acres) is small relative to the total area of the WDO, so impacts would be localized.

Individual Effects under Alternative D

The effects from ACEC/RNA Management under Alternative D are the same as those described under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways may attract more tourists to previously less accessible areas and could introduce or spread noxious and invasive weed seeds from vehicles, shoes, and clothing.

Effects from National Trails Management.

Effects Common to All Alternatives

There are no likely impacts from national trails management because these actions would not affect weed management objectives.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no effects common to all alternatives from wild and scenic rivers management.

Individual Effects under Alternative A

No WSRs would be managed under Alternative A, which would not protect rivers or riparian areas within the WDO. As such, impacts on native vegetation would not be restricted, including those from increased use, such as soil disturbance, trampling of native vegetation, and weed spread or introduction. However, in weed-infested areas, weed treatments also would not be restricted, allowing for efficient control of noxious weeds.

Individual Effects under Alternative B

No WSRs would be managed under Alternative B, and impacts are the same as those under Alternative A.

Individual Effects under Alternative C

WSRs would be managed under Alternative C and would limit other uses. As a result, there would be the most limited impacts on riparian areas. This would decrease the potential for weed spread in these areas by decreasing soil disturbance, trampling of native vegetation, and weed sources.

Individual Effects under Alternative D

No WSRs would be managed under Alternative D, and impacts are the same as those under Alternative A.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Managing the 13 WSAs within the WDO would minimize activities that would normally increase the potential for weed spread. By continuing to restrict mining, timber extraction, and OHV use, the potential for weed spread would be maintained at current levels, assuming weeds from sources such as hikers and equestrians are managed.

Certain types of weed treatments could be limited within WSAs, lowering the effectiveness of weed control or eradication in these areas in the long term.

Individual Effects under Alternative A

Wilderness characteristic areas would not be designated under Alternative A. As a result, there would be no restrictions on weed treatments. This would indirectly allow management objectives to be achieved over the long term.

Individual Effects under Alternative B

Under Alternative B, the BLM would manage six areas containing wilderness characteristics to meet multiple use and sustained yield objectives. By allowing multiple uses, Alternative B would indirectly allow management objectives to be achieved over the long term.

Individual Effects under Alternative C

Under Alternative C, the BLM also would manage six areas containing wilderness characteristics. However, Alternative C would be the most restrictive of all alternatives by implementing restrictions and stipulations in these areas, including closing mineral leasing and ROW exclusion zones. These restrictions could prevent effective weed control in certain areas by restricting access.

Individual Effects under Alternative D

Under Alternative D, the BLM also would manage six areas containing wilderness characteristics. Depending on the restrictions implemented, some weed treatments could be limited, but restrictions are unlikely to prevent management objectives from being achieved over the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

WWV sites could introduce or spread noxious and invasive weeds by allowing for more human disturbance to certain areas over the long term. People from outside the area could bring in noxious and invasive weeds, including new invasive species. People visiting WWV sites in undisturbed and remote areas could distribute weed seeds into weed-free areas. These areas are small relative to the size of the WDO, so impacts would be localized.

Individual Effects under Alternative A

An unspecified number and location of WWV sites would be developed and maintained under this alternative, the magnitude of which would vary depending on the number of WWV sites developed. Impacts are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative B

Six WWV sites would be maintained under Alternative B. Impacts would occur in these areas and are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative C

Impacts from weed spread would be the fewest under this Alternative since new routes through or near sensitive areas and increased traffic to remote areas would be avoided. This would reduce human disturbance and the associated weed spread described under Effects Common to All

Alternatives. However, impacts would still occur and would be similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative D

Impacts are the same as those described under Alternative B.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There would be no likely impact from public health and safety management because there are no actions that relate to weed management objectives.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Sustainable development management actions apply to areas that have already been developed and are likely unvegetated. Because sustainable development management actions would involve facility reuse, new operations would not create new disturbance. As a result, there would be few impacts on weed management from sustainable development actions.

Individual Effects under Alternative A

There are no actions under Alternative A that relate to sustainable development. This would have the greatest impact on weed management by allowing degradation or loss of lands from disposal, ROWs, or mineral operations. This could allow for soil disturbance, native vegetation removal, and weed introduction or spread.

Individual Effects under Alternative B

ROW and mineral operation actions could increase the potential for weed spread by allowing some degradation during development, including soil disturbance, native vegetation removal, and weed introduction or spread.

Individual Effects under Alternative C

ROW and mineral operation actions would have the greatest effect under Alternative C in lowering the potential for weed spread in developed areas by preventing degradation during and after development. This could prevent such effects as soil disturbance, native vegetation removal, and weed introduction or spread.

Individual Effects under Alternative D

Impacts from sustainable development actions are the same under Alternative D as those described under Alternative B.

Cumulative Effects

Past, present, and reasonably foreseeable actions that are relevant to weed management in the cumulative impact area include land tenure changes, allowing fire for resource benefit, fire

suppression, fuel and vegetation treatments, minerals management, population growth, urban development, recreational use, OHV use, stream and watershed restoration activities, regional planning efforts, weed management efforts, and grazing. The types of impacts that have occurred and would continue to occur from weed infestations include loss of plant diversity, loss of wildlife habitat, loss of soil integrity, changes in fire intensity and water retention rates, and reduced ecosystem function.

Several proposed actions in the Winnemucca RMP would address CC and would work to reduce CC in certain areas. Many areas that are in higher CC are degraded primarily because of weed infestations; mechanical, chemical, and biological weed treatments are proposed that would reduce this effect. Limited resources often mean that, at best, these measures would slow the rate of weed infestation or would reduce weed threat in particular areas of concern. Areas where open OHV use were allowed would be further restricted under all Winnemucca RMP alternatives, except Alternative A. Although increasingly more OHVs are used throughout the cumulative impact area, the trend toward concentrating them into designated areas would enhance weed management efforts in most habitat types by reducing the extent of disturbance and seed spread.

Cumulative effects are similar among the alternatives. Alternative A would contribute to more regional cumulative effects resulting from open OHV use and wildland fire suppression. In general, Alternatives B, C, and D would provide more management measures than Alternative A and would directly or indirectly reduce the potential for cumulative impacts.

4.2.7 Vegetation—Rangelands

Summary

This vegetative analysis is qualitative, as specific impacts of resource activities on vegetation cannot be quantified. A more detailed analysis will follow at the implementation stage, such as an allotment evaluation and EA or a permit renewal EA to comply with NEPA. Rangeland vegetation, wildland fire, livestock grazing, and cultural resources actions would have the greatest impact on rangeland vegetation within the WDO. Fewer impacts on rangeland vegetation would come from air quality, soils, water, forest and woodland vegetation, weeds, chemical and biological control, fish and wildlife, special status species, wild horse and burro, tribal consultation, visual resources, wilderness characteristics, mineral resources, recreation, renewable energy, transportation and access, lands and realty, ACECs/RNAs, backcountry byways, wilderness study areas, watchable wildlife viewing sites, and sustainable development. However, it is BLM's judgment that several of the resources areas listed below are not likely to impact rangeland vegetation resources. These areas are geological resources, riparian and wetland vegetation, paleontological resources, cave and karst resources, national trails, wild and scenic rivers, and public health and safety.

Surface-disturbing activities on public land that covers less than one acre would cause short-term disturbance to vegetation by removal or trampling, which would allow weeds to become established. Such activities include monitoring; small construction, implementation, and maintenance activities; fence building; road maintenance; wild horse and burro gathers; livestock impoundments; trap sites; recreational activities, such as camping, hiking, and backpacking; vegetation mowing; seed collection; and soil pit and cultural and paleontology site excavations for data recovery. Impacts would be limited and localized, due to the small area covered by these activities.

Alternative C, Option 2 would have the greatest impact on rangelands, as grazing would be prohibited. Alternatives A and B would be the least prohibitive toward use of rangelands, while Alternative C, Option 1, and Alternative D allow for the most resource protection.

Methods of Analysis

Methods and Assumptions

Impacts are determined by assessing which actions, if any, would change vegetation structure or composition, decrease the extent of rangeland vegetation, allow for increased dominance of invasive weeds, affect habitat value for wildlife species, or decrease grazing potential.

Some impacts are direct, while others are indirect and affect vegetation through a change in another resource. Direct impacts on rangeland vegetation are disrupting, trampling, or removing rooted vegetation, thereby reducing areas of native vegetation. Other direct impacts on rangeland vegetation are mortality from toxic chemicals and actions that unequivocally reduce total numbers of plant species or reduce or cause the loss of total area, diversity, vigor, structure, or function of wildlife habitat.

Potential indirect impacts are loss of habitat suitable for colonization due to surface disturbance, introduction of noxious weeds by various mechanisms or conditions that enhance the spread of weeds, increased noise, and general loss of habitat due to surface occupancy or surface compaction. Indirect impacts are those that cannot be absolutely linked to one action, such as decreased plant vigor or health from reduced air or water quality.

The effects of each action on vegetation resources are quantified when possible; however, many impacts must be qualitatively assessed when suitable data are not available. The following assumptions were made for the purpose of this analysis:

- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the WDO, recreational activities, wildlife and livestock grazing and their movements, and surface-disturbing activities;
- Biocontrol would continue and potentially would expand;
- Noxious and invasive weeds would further expand into native plant communities, and disturbances to these communities would expand opportunities for the spread of nonnative invasive plant species;
- Many actions that would occur within the WDO would be subject to BMPs. Although BMPs are designed to minimize the effects of projects, they generally cannot eliminate all impacts. This impact analysis assumes that BMPs will minimize but not eliminate possible effects;
- Wildfire acreages are expected to increase over the life of the plan;
- Appropriate vegetative management includes maintaining and improving leaf area and, by extension, photosynthetic potential for perennial plants. This is accomplished by providing periodic rest during the growing season, especially the critical growth period, from early seed formation through mature seed formation. Leaf areas are reduced by spring grazing if periodic rest is not provided or if sufficient regrowth does not occur during the critical

growth period, leading to a decline in plant health. Leaf areas are further depleted by double grazing the same perennial plant in both spring and fall of the same year. This slowly leads to a decrease in plant size and vigor and the eventual loss of the plant; and

- Appropriate vegetative management would also maintain or improve native plant communities to protect soil and water resources while providing habitat. Adequate seedling establishment and young plant recruitment is essential to maintaining or increasing native species in a plant community. Development of sufficient seedling root growth is necessary for seedlings to develop vigor and produce viable seed.

Effects from Air Quality Management

Effects Common to All Alternatives

Restrictions on prescribed fire and wildfire use to protect air quality may reduce opportunities to burn in any given year. This may prevent certain rangeland treatments from being implemented and indirectly hinder the achievement of healthy rangeland conditions. However, it is not expected that these restrictions would completely prevent implementation and accomplishment over the long term.

Effects from Geology Management

Effects Common to All Alternatives

Impacts from geology management actions on rangelands would be limited and, thus, negligible.

Effects from Soil Resources Management

Effects Common to All Alternatives

Soil erosion reduction measures involving seeding and improving vegetative cover would reduce compaction and increase infiltration, which would indirectly improve rangeland health over the short term. As a result, vegetative productivity and diversity would be increased, which would increase litter, soil fertility, infiltration, and nutrient cycling in the long term, which would be a direct effect.

Individual Effects under Alternative A

Impacts on rangelands would vary depending on the grazing management system, reclamation and rehabilitation treatments, and success or failure of the treatments. Impacts would be long term.

Individual Effects under Alternative B

Impacts from land reclamation activities relating to soils management under Alternative B are the same as those described under Alternative A.

Soil compaction prevention measures under Alternative B would seek to mitigate adverse effects without seasonal closures. As such, range vegetation would be directly impacted year-round, even when soils would be most susceptible to compaction. However, treatments to rangeland vegetation could occur year-round, indirectly facilitating rangeland health and multiple use objectives in the long term.

Individual Effects under Alternative C

Land reclamation actions under Alternative C would have the greatest benefit to rangeland vegetation by requiring reclamation of all surface-disturbing activities. This would allow native vegetation to reestablish and would directly help to achieve rangeland health, diversity, and productivity goals in the long term.

Soil compaction prevention measures are the most stringent under Alternative C, providing for seasonal use restrictions. This would indirectly benefit rangeland health by preventing compaction when the soil is most susceptible to disturbance, but would limit multiple uses and the timing of range improvement treatments in the long term.

Individual Effects under Alternative D

Land reclamation actions under Alternative D would provide the most flexible approach to land reclamation. Impacts on rangeland vegetation would vary, depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Impacts would be long term.

Soil compaction prevention measures would implement seasonal use restrictions on a case-by-case basis. Impacts on rangeland vegetation include improved health and vigor from decreased soil compaction and increased infiltration. Further, multiple use objectives could be achieved in the long term because restrictions would allow for more flexibility than those under Alternative C.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Under this alternative, priority watersheds would not be managed. However, impacts on water resources would be reduced by complying with water quality regulations and implementing BMPs and land health standards. This would indirectly protect rangeland vegetation throughout the WDO, since rangeland vegetation health could be affected by water quality. However, Alternative A would provide the fewest action- and location-specific protections of all alternatives.

Individual Effects under Alternative B

Priority watershed actions would indirectly protect rangeland vegetation in those areas in the long term by restricting certain activities. Under this alternative, multiple uses would be allowed, which would allow for range treatments to directly achieve health and multiple use objectives. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative C

Priority watershed actions under Alternative C would provide the greatest indirect protection to rangelands within those areas since they would be the most restrictive of all alternatives. However, as exclusion zones, they also would prevent direct range improvement treatments that are

incompatible with the watershed's primary use. Impacts would vary on a case-by-case basis and would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative D

Priority watershed actions would indirectly protect rangelands in the long term, as described under Alternative B. As avoidance areas, they may directly limit range rehabilitation treatments and multiple uses in certain areas. Mitigation measures would be implemented when avoidance is not possible, which would allow for some flexibility in achieving healthy rangeland conditions. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

There are no effects common to all alternatives from forest and woodland product management.

Individual Effects under Alternative A

Actions using fire as a management tool would efficiently reduce the fuel load in forests, preventing catastrophic fires that could spread to adjacent rangelands and destroy native vegetation. This would have long-term indirect effects in localized areas.

Individual Effects under Alternative B

Impacts from forest and woodland product management are similar to those described under Alternative A.

Individual Effects under Alternative C

Prescribed fire would not be used as a management tool under Alternative C, which would be least effective in reducing the fuel load in forests. As a result, catastrophic fires could occur that could spread to adjacent rangelands and destroy native vegetation in the long term in localized areas.

Individual Effects under Alternative D

Actions using fire as a management tool would have impacts similar to those described under Alternative A. However, the variety and breadth of treatment types would provide a more flexible adaptable approach to stand management, including eradication of noxious and invasive species. As such, Alternative D has a high likelihood to efficiently reduce the fuel load in forests, preventing catastrophic fires that could spread to adjacent rangelands and destroy native vegetation. This would have long-term indirect effects in localized areas.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Actions to decrease weeds on BLM-administered lands would indirectly improve rangeland health and community composition by increasing native species, restoring a more natural fire regime, and decreasing the risk of catastrophic wildfire in both the short and long term. Such a fire could damage or kill native vegetation and allow for weed spread or invasion.

Individual Effects under Alternative A

Weeds actions using prescribed fire would disturb or destroy rangeland vegetation in the short term, while in the long term achieving improved range health and composition more quickly. Prescribed fire is not used to control weeds over large areas, so impacts would be direct, localized, and small scale. Approved biological controls are specific to target species, so there would be no direct impact on nontarget species. To minimize harmful effects, chemical treatments would be applied according to label directions and following established guidelines, best management practices, and standard operating procedures for application. Chemical applications would also be designed to avoid effects on nontarget species, which would be short term but would lead to long-term indirect improvement in vegetation composition. Using Integrated Pest Management (IPM) practices would make use of one, several, or all available management practices, such as chemical, biological, mechanical, or prescribed fire, and would provide an adaptive and effective approach to weed management on rangelands in the long term.

Preparing pesticide and biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO. This would prevent impacts on nontarget species, such as sagebrush and salt desert scrub species.

Individual Effects under Alternative B

Impacts from weeds management actions are similar to those described under Alternative A.

Individual Effects under Alternative C

Mechanical and biological weed treatments would be used under Alternative C, which would remove weeds, thus indirectly helping to achieve rangeland health and composition objectives in the long term. Alternative C would not use prescribed fire or herbicides as weed management tools, which could limit effective control of some invasive species. Approved biological controls are specific to target species, so there would be no impact on nontarget species. Further, preparing biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO.

Using IPM practices would make use of one or both available management practices, such as biological or mechanical control, to provide an adaptive and effective approach to control pest species and weeds in the long term.

Individual Effects under Alternative D

Impacts from weeds management actions are similar to those described under Alternative A.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Using chemical control methods would help control and reduce weed outbreaks. Effects are similar to those described under weeds management.

Individual Effects under Alternative A

Using both biological and chemical control methods, as well as IPM techniques, would provide an adaptive and effective approach to weed management on rangelands, causing an indirect effect in the long term by removing weeds. Preparing pesticide and biological use proposals, in addition to cooperation with agencies, would ensure that only safe and effective treatments would be used within the WDO. This would prevent impacts on nontarget species, such as sagebrush and salt desert scrub species.

Individual Effects under Alternative B

Effects from chemical and biological control are the same as those described under Alternative A.

Individual Effects under Alternative C

The focus on biological control methods would remove some weeds but would limit the effectiveness of weed management on rangelands in the long term under Alternative C, causing an indirect effect. However, use of IPM techniques would provide an adaptive and effective approach to weed management in the long term. Preparing biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO.

Individual Effects under Alternative D

Effects from chemical and biological control are the same as those described under Alternative A.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Vegetation treatments for range improvement projects would continue to occur at current rates to reach rangeland improvement goals. Projects would vary from year to year based on resource needs and priorities. All range improvements would result in direct, minor, and short-term disturbances to vegetation, including loss of vegetation cover and changes in plant composition adjacent to each project. Indirect effects include increased susceptibility for infestations of noxious and invasive weeds transported by livestock. The use of range improvement projects are intended to maintain and improve vegetation conditions, while making progress toward or meeting rangeland standards for upland plant communities in the long term.

Post-fire rehabilitation efforts, including a prohibition against grazing, would reduce the ability for weeds to invade and would support native species growth. This would indirectly help to achieve healthy rangeland conditions in the long term.

Individual Effects under Alternative A

Grazing management systems and practices would decrease fuel loads and would reduce the likelihood of catastrophic fire over large areas, which would destroy native vegetation. Prescriptive grazing would be used, and if applied correctly, this could have direct effects by increasing native vegetative cover, and indirect effects by decreasing weeds on rangelands, which would help to restore a natural fire regime.

Vegetation cover in Alternative A would be directly improved by using a diversity of native and introduced grass, forb, and shrub seeds and seedlings when rehabilitating rangelands. This improvement in vegetative cover would indirectly prevent the invasion of weeds and would reduce the likelihood of catastrophic fire.

A variety of rangeland treatments would be implemented to achieve healthy rangeland conditions throughout the WDO. This variety would provide flexibility in BLM's approach to rangeland rehabilitation and would provide a direct and effective means of achieving rangeland health goals. These treatments would focus on improving the understory of sagebrush communities.

Individual Effects under Alternative B

Grazing management systems and practices would have impacts similar to those described under Alternative A.

Introduced grass and forb seeds would be used under Alternative B when rehabilitating rangelands. This could directly impact rangeland health, productivity, and diversity, depending on which species are chosen for rehabilitation efforts. Impacts would vary on a case-by-case basis.

Crested wheatgrass seedings would be used to provide livestock forage on rangelands, with an emphasis on productivity. Although not a native species, crested wheatgrass would provide vegetative cover and would prevent weed invasion on rangelands. However, this species would not improve rangeland diversity or ecological health and function.

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would indirectly protect native vegetation from catastrophic fire. This would prevent weed invasion and indirectly would promote healthy, productive, native vegetation in this area in the long term.

Individual Effects under Alternative C

Option 1

Grazing management systems and practices would have impacts similar to those described under Alternative A.

Rehabilitation efforts would be limited by using only native seeds because in most year's seed supplies are exhausted because of demand. As a result, large areas would be untreated, which would allow for weed invasion. This could change the fire regime by increasing wildland fires on these lands, and that would indirectly cause a decline in vegetation condition in the long term.

Fewer treatments would be implemented to rehabilitate rangelands throughout the WDO. This would directly limit the effectiveness of rangeland rehabilitation because additional treatments could provide more flexibility towards achieving this goal. These treatments would focus on improving the understory in both sagebrush and salt desert scrub communities, which would impact a larger portion of the WDO. In addition, fragmentation of sagebrush would be avoided, and SOPs (Appendix B), BMPs (Appendix B), and mitigation measures would be employed to minimize impacts on sagebrush communities.

Restoring CC to Class II levels on 70,000 acres would have impacts similar to those described under Alternative B.

Option 2

Grazing would not be permitted under this option. This would have the greatest reduction in impacts on rangelands of all alternatives.

Native seeds would be used when rehabilitating rangelands and the impacts are similar to those under Alternative C, Option 1.

The impacts from restoring CC to Class II levels on 70,000 acres are similar to those described under Alternative B.

Individual Effects under Alternative D

The impacts from grazing management systems and practices are similar to those described under Alternative A.

The impacts from using both native and introduced seeds and seedlings are similar to those under Alternative A.

A variety of rangeland treatments would be implemented to achieve healthy rangeland conditions throughout the WDO and the impacts are similar to those described under Alternative A.

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would indirectly protect native vegetation from catastrophic fire. Impacts are similar to those described under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

There are no likely impacts on rangeland vegetation from riparian and wetland vegetation management actions.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Implementing HMPs that specify vegetation treatments to improve habitat would involve altering species composition and vegetation structure. This would cause a short-term direct disturbance to rangeland vegetation, while improving range condition over the long term.

Mitigation measures would be implemented for actions near nesting migratory birds. This would allow for rangeland management actions to proceed and would protect nesting migratory birds.

Individual Effects under Alternative A

Under this alternative, actions would not prioritize habitats for protection. Lack of such protections could cause impacts from human use and access, including indirect effects from soil disturbance or

direct effects from vegetation disturbance. These effects could cause reduced plant vigor and productivity and increased competition from weeds.

Individual Effects under Alternative B

Under this alternative, no acres of priority 1 habitat and 716,528 acres of priority 2 habitat would be designated. This would prioritize rangeland treatment areas as well, allowing for a more effective and efficient range rehabilitation strategy in the long term.

Individual Effects under Alternative C

Under Alternative C, 1,279,481 acres of priority 1 habitat and 869,645 acres of priority 2 habitat would be designated. Impacts are similar to, but greater than, those described under Alternative B because Alternative C designates a higher acreage of priority habitat.

Individual Effects under Alternative D

Under this alternative, 699,929 acres of priority 1 habitat and 1,325,967 acres of priority 2 habitat would be designated. Impacts are similar to, but greater than, those described under Alternative B because Alternative D designates a higher acreage of priority habitat.

Effects from Special Status Species Management

Effects Common to All Alternatives

Actions to avoid impacts on listed or sensitive species or their habitat could directly alter implementation or timing of vegetation management treatments. This could indirectly preclude reaching certain management goals, such as having productive and healthy rangelands. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

However, maintenance and improvement of special status species habitat, particularly sagebrush obligates, would directly help to improve rangeland health and diversity throughout the WDO.

Individual Effects under Alternative A

Restrictions on actions near special status plants, sage-grouse and sage-grouse leks, pygmy rabbits, bat habitat, and raptors could directly impact rangeland management by limiting the type, timing, and location of treatments. However, special status species protections would help create a lower level of disturbance in rangelands, indirectly fostering native vegetation and preventing weed invasion in these areas.

Individual Effects under Alternative B

Alternative B places the least stringent restrictions on actions near special status plants, sage-grouse and sage-grouse leks, pygmy rabbits, bat habitat, and raptors. However, these restrictions could still directly impact rangeland vegetation management by limiting the type, timing, and location of stand treatments. This would indirectly prevent range health, composition, diversity, and productivity goals from being achieved. Such restrictions would limit multiple uses in certain areas near special status species. However, special status species protections would help create a lower level of disturbance on rangelands, causing an indirect effect by providing for lower potential for weed spread and soil

disturbance in these areas. Impacts would vary depending on the location and rangeland management actions proposed.

Individual Effects under Alternative C

Alternative C places the greatest amount of restrictions on activities that could occur near special status species and their habitats. Of all the alternatives, this alternative would have the greatest impact on range improvement treatments and multiple use but also would limit disturbance to soils and native vegetation on rangelands.

Individual Effects under Alternative D

Impacts from these actions are similar to those described under Alternative A.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Impacts on vegetation resulting from wild horse and burro management actions include direct effects, such as removing forage, and indirect effects, such as compacting soil, which alter the amount, condition, production, and vigor of vegetation in grazed areas. Impacts from wild horse and burro management may occur from yearlong use, indirectly resulting in lower vigor of desired plant species and a change in plant species composition. Overuse of vegetation adjacent to water sources, troughs, and livestock reservoirs results in a loss of plant cover. This allows localized areas to become dominated by invasive plants. Vegetation recovery on a burned area could be slowed or reduced by wild horses and burros.

Individual Effects under Alternative A

Maintaining established AMLs as a population range, using gathers when AML is exceeded, and using fertility control inhibitors would be the most effective in maintaining WHB numbers within AML. This would indirectly result in improved vegetation conditions by reducing the impact of WHB on rangeland vegetation.

Converting AML between wild horse use and burro use would spread impacts on rangelands through time, as the species have different habitat and forage preferences. Maintaining the free-roaming nature of WHB would spread impacts geographically through the HMAs. Both actions would indirectly benefit rangeland health by minimizing WHB impacts on vegetation.

WHB protections, such as limitations to certain proposed activities, such as motor vehicle racing, would protect desirable vegetation from disturbance and would indirectly prevent rangeland impacts from soil compaction and weed spread in the long term.

Individual Effects under Alternative B

Impacts from population control measures under Alternative B are similar to those under Alternative A.

AML reduction in response to decreased WHB private water supply would improve vegetation conditions by reducing the impact of WHB on rangeland vegetation.

Under Alternative B, AML would not be converted between wild horse use and burro use, which would impact rangeland health by concentrating direct WHB impacts, such as trampling, and indirect impacts, such as compaction and weed spread, within the HMAs.

Protection measures for WHB would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Alternative C would control WHB populations by maintaining AML as a single number, using four-year (or longer) gather cycles, and would not allow use of fertility control inhibitors. This would have the greatest indirect impact from WHB on rangelands by ineffectively managing WHB populations to reduce impacts on rangeland vegetation. However, actions would still decrease the risk of soil compaction, trampling, and weed spread or introduction. Range health, plant community composition, and plant productivity would be directly and indirectly impacted. However, AML reduction in response to decreased water availability for WHB would decrease impacts of WHB on rangeland vegetation.

Impacts from conversion of AML between wild horse use and burro use, as well as from maintaining the free-roaming nature of WHB within HMAs, are similar to those described under Alternative A.

Protection measures for WHB would be the greatest under Alternative C and would prohibit or limit certain activities, such as motor vehicle racing, in HMAs unless impacts were determined to be minimal. This would protect soils and vegetation from disturbance and would prevent destruction of rangelands from human use, including direct effects from trampling and indirect effects from dust and litter.

Individual Effects under Alternative D

Impacts from population control measures and development of alternative water sources are similar to those described under Alternative A.

Impacts from conversion of AML between wild horse use and burro use, as well as from maintaining the free-roaming nature of WHB within HMAs, are similar to those described under Alternative A.

Impacts from WHB protection measures are similar to those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildland fires result in short-term direct loss of vegetation and a long-term change of community composition. The vegetation response to fire depends on the size, location, intensity, season, timing, and amount of precipitation, the preexisting plant community condition, and the abundance of noxious and invasive weeds in the area. Fires have direct effects by changing the composition of the plant community, delaying plant succession, and removing woody vegetation and plant litter. Wildland fires might burn with enough heat to kill soil organisms and root systems, resulting in diminished plant recruitment and growth rates, particularly for fire-sensitive species. Emergency stabilization and burned area rehabilitation treatments, such as seeding with native perennial plant

species, would be implemented to rehabilitate degraded rangeland and improve rangeland health in the long term.

Indirectly, wildland fires impact rangelands by creating an opportunity for the establishment or spread of noxious and invasive weeds. This is because fires remove aboveground vegetation, leaving burned areas with bare soil that is more susceptible to noxious and invasive weeds. Some species of noxious and invasive weeds respond well to post-fire conditions and outcompete native species. In areas where noxious and invasive weeds occur or are in close proximity, wildland fire increases the likelihood of weed expansion. Firefighters and their equipment might also introduce or spread noxious and invasive weeds. Some mechanical control activities disturb the soil surface and remove vegetation, creating an opportunity for the establishment or spread of noxious and invasive weeds.

Wildfire suppression and creation of fuel breaks would prevent catastrophic destruction of rangelands, which would indirectly preserve native vegetation and diversity in these areas over the long term. Surface disturbance resulting from fire line construction, use of heavy equipment, and other fire suppression activities would directly damage vegetation and would have indirect effects by accelerating soil erosion in localized areas. However, these areas would be rehabilitated to minimize long-term impacts.

Because fire retardants are composed largely of nitrogen and phosphorus fertilizers, they may encourage growth of some species at the expense of others, resulting in changes in community composition and species diversity. Differential growth may also influence herbivorous behavior; both insect and vertebrate herbivores tend to favor new rapidly growing shoots.

Fuels management actions would result in short-term direct loss of vegetation on a small scale. Projects would reestablish native vegetative communities, providing for healthy, diverse rangelands over the long term. These actions would allow fire to play its natural role more frequently and would reduce the likelihood of catastrophic wildfire, which would indirectly protect native rangeland vegetation in the long term and over large areas.

Implementing a response to wildfires based on social, legal, and ecological consequences of the fire would indirectly protect rangelands from catastrophic fire, which would protect native vegetation, prevent weed invasion, and maintain rangeland productivity and health.

Individual Effects under Alternative A

No additional impacts would occur from wildland fire management actions under Alternative A.

Individual Effects under Alternative B

Under this alternative, 110,167 acres of land would be designated as suitable for allowing fire for resource benefit. These areas would be more vulnerable to weed invasion, which would indirectly degrade rangelands and prevent the establishment of native vegetation. However, because many of the areas allowing fire for resource benefit are higher elevation woodland areas that have lower potential for weed invasion after burning, impacts on rangelands would be minimized.

Individual Effects under Alternative C

No additional impacts would occur from wildland fire management actions under Alternative C.

Individual Effects under Alternative D

Under Alternative D, 9,932 acres would be designated as suitable for allowing fire for resource benefit. Impacts are similar to but less than those under Alternative B because Alternative D has fewer acres designated for allowing fire for resource benefit.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Cultural inventory requirements present a considerable impact on rangelands throughout the WDO. In large fire years, emergency drill seedings cannot be implemented before a cultural inventory of the affected area. This can be costly and can directly prevent timely action during optimum seeding windows. Seeded species are then often poorly established, which indirectly increases the potential for weed spread and fire frequency. In the long term, this prevents establishment of native species.

Protections to cultural resources would indirectly prevent disturbance and fragmentation of rangelands, providing for a more healthy and resilient community. These areas are small relative to the total area of the WDO, so impacts would be localized.

Site monitoring, conservation measures, use restrictions, and law enforcement actions would indirectly prevent disturbance to and degradation of rangelands, while potentially impacting the ability to reach other rangeland vegetation goals over the long term in certain areas.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consulting with tribes to identify culturally significant plants, important habitats, and traditional use locations would emphasize protection of natural resources, including rangelands. This would limit disturbance and indirectly foster vegetation health over the long term in certain areas. Consultation could place higher treatment priority in areas not previously identified or could limit actions in planned treatment areas. Impacts would vary on a case-by-case basis and are likely to be localized.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Areas with paleontological resources are small and localized within the WDO. As a result, impacts from paleontological management actions on rangelands would be limited.

Effects from Visual Resources Management

Effects Common to All Alternatives

Implementing VRM guidelines, particularly managing WSAs as Class I, would increase the difficulty of accomplishing vegetation management actions and may affect the dimensions and locations of rangeland treatments. This is because vegetation treatments could change the visual character of rangelands. In these areas, healthy rangeland conditions might not be achieved.

Individual Effects under Alternative A

Under Alternative A, 420,271 acres and 346,302 acres would be managed to VRM Class I and II guidelines, respectively. These actions would limit the scope of plant removal or prescribed burning activities and would prohibit treatments and prescriptions that would change the visual character. Overall, meeting VRM Class I and II guidelines would increase the difficulty of accomplishing rangeland management actions and would limit the extent or effectiveness of the management goals.

Individual Effects under Alternative B

Under Alternative B, 417,605 acres and 391,203 acres would be managed to VRM Class I and II guidelines, respectively. This alternative is the least restrictive to rangeland treatment implementation. Impacts are similar to those described under Alternative A.

Individual Effects under Alternative C

Under Alternative C, 417,605 acres and 3,083,858 acres would be managed to VRM Class I and II guidelines, respectively. This alternative would be the most restrictive to rangeland treatment implementation. Impacts are similar, although greater in magnitude, than under Alternative A.

Individual Effects under Alternative D

Under Alternative D, 417,605 acres and 2,780,416 acres would be managed to VRM Class I and II guidelines, respectively. Impacts are most similar in nature and magnitude to Alternative C.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

There are no likely impacts on rangeland vegetation from cave and karst resource management actions.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

There are no effects common to all alternatives from livestock grazing management.

Individual Effects under Alternative A

Direct impacts on vegetation resulting from livestock grazing management actions include removing forage, which alters the amount, condition, production, and vigor of vegetation in grazed areas. Impacts from livestock grazing are usually related to a long duration of use during the growing season, resulting in lower vigor of desired species and a change in species composition. Often, the vegetation is disturbed around salting areas, bed grounds, troughs, and stock reservoirs, and there is a loss of plant cover, which usually results in localized areas dominated by invasive plants. Further, degraded rangeland that is grazed yearly lacks substantial native vegetation to outcompete invaders.

Livestock grazing would be open on 8,232,727 acres of land under this alternative, which would have the greatest impact on rangeland management. Impacts could occur as described above, but

actions under Alternative A must maintain and improve rangeland in accordance with the Standards for Rangeland Health.

To minimize impacts on rangelands, grazing management strategies, such as rotation, deferment, rest from use, and season of use and grazing intensity, would be implemented. These strategies would help to manage composition, cover, and the vigor of vegetation and would provide rest periods for plant growth and seed production to maintain plant vigor. The objective of these strategies is to maintain and improve vegetation conditions while making progress toward or meeting rangeland standards for upland plant communities. The response of vegetation to these strategies would be monitored, and adjustments would be made accordingly to achieve the desired response. Range improvement actions would also be implemented to help increase native vegetation and to decrease the number and extent of weed populations in the long term.

Lands closed to grazing on the remainder of land in the WDO would lower impacts on rangeland vegetation in these areas, as livestock would not be compacting soils or acting as a mechanism for seed dispersal.

Individual Effects under Alternative B

Livestock grazing would be open on 8,232,727 acres of land under this alternative. Grazing, including that on acquired lands, allowing temporary nonrenewable use, and allowing for continuous season-long use, would facilitate the most intensive land use. Impacts are similar to those described under Alternative A.

Range improvement actions would directly help increase native vegetation and decrease the number and extent of weed populations in the long term. These actions would be difficult to implement successfully and efficiently under Alternative B, due to the large acreage that would be open to grazing.

Lands closed to grazing on the remainder of land in the WDO would have lower indirect impacts on rangeland vegetation in these areas, as livestock would not be compacting soils, disturbing native vegetation, or acting as a mechanism for seed dispersal.

Individual Effects under Alternative C

Option 1

Livestock grazing would be open on 8,038,084 acres of land under this alternative. Grazing would facilitate weed spread and introduction similar to impacts described under Alternative A. However, Alternative C, Option 1 would not allow grazing on acquired lands or temporary nonrenewable use and would only allow for two years of consecutive grazing during the critical growth period. This would minimize the intensity of land use and impacts from livestock and would foster rangeland health and productivity.

Lands closed to grazing on the remainder of land in the WDO would lower indirect impacts on rangeland vegetation in these areas, as livestock would not be compacting soils or acting as a mechanism for seed dispersal.

Range improvement actions would be somewhat more restricted and could limit the type, timing, and location of rangeland treatments.

Option 2

Livestock grazing would be closed on all lands within the WDO, so this alternative would be the most effective at reducing impacts caused by livestock on rangeland vegetation on BLM-administered lands.

Individual Effects under Alternative D

Alternative D would have 8,016,754 acres of land open to grazing. Impacts are similar to those described under Alternative A, except with fewer acres of land open to grazing.

Impacts from range improvements are similar to those described under Alternative B.

Effects from Minerals Management

Effects Common to All Alternatives

General

Impacts on rangeland vegetation could result from fluid, leasable, and locatable mineral development and mineral material sales and disposal. Most minerals management impacts on vegetation are on the sagebrush and saltbush scrub communities. Direct impacts associated with these actions include loss or injury of plants due to excavation and toxic responses from chemical use in mineral extraction or waste pits. Indirect impacts include increased exposure to dust and other contaminants associated with construction of infrastructure and use of access roads. In the worst-case scenario, all vegetation would be removed from a parcel of land, and the site would be permanently altered. Regulations, although they might differ among the mineral categories, are in place to protect existing vegetative communities or to ensure the reestablishment of desirable vegetation following completion of the mineral and fluid management actions. Overall, rangeland vegetation could be altered by minerals management actions, but mitigation measures would be implemented to lessen the impact on vegetation resources.

RFDs

Under the reasonably foreseeable development scenario, impacts on rangeland vegetation would continue. Vegetation would be fragmented, which would increase the susceptibility of the community to weed invasion in the long term.

Individual Effects under Alternative A

Alternative A would open the greatest acreage and would close the least acreage to mineral development, thus having the greatest likelihood of impacting rangeland vegetation. Impacts would be similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative B

Compared with Alternative A, Alternative B would open fewer acres and would close more acres to mineral development, thus having less likelihood of impacting rangeland vegetation. Impacts would be similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative C

Alternative C would open the fewest acres and would close the most acres to mineral development, thus having the least likelihood of impacting rangeland vegetation of all alternatives. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative D

Compared with Alternatives A and B, Alternative D would open fewer acres and would close more acres to mineral development, thus having less likelihood of impacting rangeland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Managing BLM-administered lands to provide dispersed recreation could impact rangelands throughout the WDO through direct means, such as human disturbance to vegetation, and indirect means, such as and weed introduction or spread.

OHV use would result in direct impacts on vegetation, such as reduced vegetative cover and density, as well as indirect effects, such as soil compaction and increased dust. OHV users would introduce and spread noxious and invasive weed seeds from their vehicles, shoes, clothing, and recreation equipment. OHV activities in undisturbed and remote areas could distribute weed seeds into weed-free areas. These indirect effects could decrease plant vigor and productivity, alter community plant composition, and cause plant mortality on rangelands.

To manage OHV use, the Transportation Plan would be updated and would account for wildlife habitat, including rangeland vegetation. Site-specific NEPA analysis would be done on an implementation level to minimize impacts on rangeland vegetation.

Individual Effects under Alternative A

Under Alternative A, there would be no camping limitations or prohibitions throughout the WDO. In addition, the Pine Forest SRMA would be maintained, and issuance of special recreation permits would be the least restricted. The greatest acreage would be open to OHVs under Alternative A (6,782,790 acres), the least amount of land would be limited (416,652 acres), and 24,832 acres would be closed. Combined, these actions could degrade rangelands throughout the WDO as described under Effects Common to All Alternatives.

Individual Effects under Alternative B

Camping limitations and prohibitions throughout the ERMA would minimize impacts on rangelands on these lands. In addition, designating three SRMAs would impact range vegetation to varying degrees, depending on the recreation market identified for the SRMA. For example, the Nightingale SRMA would be targeted for undeveloped recreation-tourism, which would have less of an impact than the Winnemucca and Pine Forest SRMAs, which allow for increased motorized vehicle access. Under Alternative B, 1,460,200 acres would be open to OHVs, with the least amount of land closed (24,832 acres) and with 5,445,218 acres limited. These actions could degrade rangelands throughout the WDO. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed.

Issuance of special recreation permits would be the least restricted under this alternative, which could cause some direct impacts on rangelands through increased human use and trampling, and indirect impacts through soil compaction, increased litter, and weed invasion.

Individual Effects under Alternative C

Camping limitations and prohibitions throughout the ERMA would have similar impacts on rangelands as Alternative B. In addition, designation of two SRMAs would have impacts on rangeland vegetation similar to those described under Alternative B. Under Alternative C, no acres would be open to OHVs, 61,427 acres would be closed, and 7,143,177 acres would be limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. As such, impacts from recreation actions would be fewest under this alternative, as it is the most restrictive and prohibitive. However, impacts would occur, and they are similar to those described under Effects Common to All Alternatives.

Issuance of special recreation permits would be the most restrictive under Alternative C and would cause the fewest direct impacts on rangelands through increased human use and trampling and indirect impacts through soil compaction, increased litter, and weed invasion.

Individual Effects under Alternative D

Camping limitations and prohibitions throughout the ERMA would have impacts similar to those described under Alternative B. In addition, designating three SRMAs would have the same impacts on range vegetation as those described under Alternative B. Under Alternative D, 289,932 acres would be open to OHVs, 35,483 acres would be closed, and 6,878,592 acres would be limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. Together, impacts from these actions are similar to those described under Effects Common to All Alternatives.

Issuance of special recreation permits would cause impacts similar to those described under Alternative A.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Direct impacts on rangeland vegetation could occur with issuance of new ROWs, which require vegetation clearing and access roads and would disturb or destroy vegetation. ROWs may spread or introduce weeds, indirectly reducing rangeland health and diversity. However, BMPs, stipulations, and mitigation measures would be implemented, which would minimize impacts on rangeland vegetation.

Individual Effects under Alternative A

Maintaining existing exclusion areas within the WDO could limit the type and timing of treatments and multiple use activities on rangelands. However, this action would protect and limit disturbance to native vegetation and would prevent weed invasion or spread caused by development.

Individual Effects under Alternative B

Designating avoidance areas within the WDO could limit the type and timing of treatments and multiple use activities on rangelands. However, this action would protect and limit disturbance to vegetation and soils and would prevent weed invasion or spread caused by development.

Individual Effects under Alternative C

Under Alternative C, the BLM would designate the largest acreage of avoidance areas and exclusion zones of all alternatives. This would have the greatest impact on rangelands by protecting and limiting disturbance to vegetation and soils and by preventing weed invasion or spread. However, these actions could limit the type and timing of treatments and multiple use activities on rangelands.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones within the WDO would have impacts on weed management similar to those described under Alternative C.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Maintaining roads necessary for fire suppression would provide access to rangelands and would allow for suppression of wildfires when necessary. This would indirectly help to protect rangeland vegetation and would effectively manage fire on these lands in the long term.

Noxious weed control measures would prevent the spread of weeds onto rangelands, would prevent competition with native species, and would indirectly help achieve healthy rangeland conditions.

Individual Effects under Alternative A

Transportation actions under Alternative A would not protect wildlife, sensitive species, or their habitat. As a result, rangelands could be directly impacted by road and trail construction through vegetation removal. Rangelands could be indirectly affected by soil compaction, weed invasion, and

increased dust. However, improved and increased access to rangelands would facilitate implementation of range treatments and would allow for multiple uses.

Individual Effects under Alternative B

Transportation actions to minimize effects on wildlife, sensitive species, and habitat would protect and limit disturbance to vegetation and soils and would prevent weed invasion or spread from road or trail construction or transport on vehicles. However, these actions could limit access to certain rangelands for management and would prevent multiple uses in certain areas.

Individual Effects under Alternative C

Transportation actions to minimize effects on wildlife, sensitive species, and habitat would have impacts similar to those described under Alternative B.

Individual Effects under Alternative D

Transportation actions to minimize effects on wildlife, sensitive species, and habitat are similar to those described under Alternative B.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Land and realty management actions would result in direct effects, such as short-term surface disturbance and vegetation removal, and indirect effects such as increased susceptibility to weed invasion or spread of existing weed patches. Disturbed areas would be reclaimed and seeded. Land sales could affect vegetation resources by changing the vegetative cover through urbanization or agricultural or industrial development.

Vegetation and wildlife habitat value would be given consideration when the WDO makes disposal and acquisition decisions. Impacts on rangeland vegetation would vary on a case-by-case basis, but impacts should be minimized because only lands with little resource values would be identified for disposal, and further NEPA documentation would minimize potential impacts on rangelands. Acquisition of rangelands would provide additional opportunities to achieve rangeland objectives.

ROWs cause habitat alteration from their footprint for the facilities that are authorized and could have direct effects by causing removal of vegetation. Indirect effects include soil compaction, weed invasion, and increased dust in these areas. Most of the footprints are localized and cover a small area, but ROWs tend to be linear and may stretch for miles. Many of the impacts associated with ROWs can be mitigated on a case-by-case basis.

Individual Effects under Alternative A

Issuance of ROWs would not be limited, and avoidance areas or exclusion zones for lands and realty management actions would not be designated under Alternative A. Impacts are similar to those described under Effects Common to All Alternatives. However, no restrictions would be placed on range treatments, thus increasing the potential that a healthy range condition could be achieved throughout, or in portions of, the WDO.

Individual Effects under Alternative B

The impacts from designating avoidance areas are similar to those described under renewable energy management actions under Alternative B.

The impacts from issuing ROWs are similar to those described under Alternative A.

Individual Effects under Alternative C

The impacts from designating avoidance areas and exclusion zones are similar to renewable energy management actions under Alternative C.

Restricting ROW issuance would protect and limit vegetation disturbance, fragmentation, and weed invasion or spread from road construction. This would help to maintain healthy rangeland vegetation over the long term. However, this action could limit implementation of rehabilitation treatments and could prevent multiple uses in certain areas.

Individual Effects under Alternative D

The impacts from designating avoidance areas and exclusion zones are similar to renewable energy management actions under Alternative D.

The impacts from issuing ROWs are similar to those described under Alternative A.

Effects from ACEC/ RNA Management

Effects Common to All Alternatives

There are no effects common to all alternatives from ACEC/RNA management.

Individual Effects under Alternative A

Maintaining the Osgood Mountain Milkvetch ACEC would protect vegetation and habitat and would indirectly prevent disturbance and fragmentation of rangeland within the ACEC by limiting human uses, such as recreation and development.

Individual Effects under Alternative B

Effects from ACEC/RNA management under Alternative B are the same as those described under Alternative A.

Individual Effects under Alternative C

Designating four ACECs within the WDO would limit human uses in these areas and would provide the greatest protection to native vegetation and would indirectly prevent disturbance and fragmentation of rangeland within these ACECs. However, implementing certain range rehabilitation treatments could be limited in areas, depending on habitat sensitivity.

Individual Effects under Alternative D

Effects from ACEC/RNA management under Alternative D are the same as those described under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways may attract more tourism to areas they access and could increase human use and degradation of nearby rangelands. The only BCB is the Lovelock Cave, but expanding BCBs could cause greater impact on rangelands. Impacts would vary depending on the locations of new BCBs and the areas they would access.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts from national trails management because these actions would not affect rangeland vegetation management.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no likely impacts on rangeland vegetation from wild and scenic rivers management.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

WSAs are protected areas and would prevent disturbance to native vegetation in certain rangeland areas within the WDO. However, these would impact rangeland vegetation treatments on these lands, preventing achievement of rangeland health goals in the long term.

Individual Effects under Alternative A

Wilderness characteristic areas would not be designated under Alternative A. As a result, there would be no restrictions on rangeland management actions. This would indirectly allow management objectives to be achieved over the long term.

Individual Effects under Alternative B

Under Alternative B, the BLM would manage six areas containing wilderness characteristics to meet multiple use and sustained yield objectives. As a result, rangeland management actions would not be restricted, which would benefit rangeland vegetation. Allowing multiple uses could allow some impacts on rangeland vegetation from trampling, weed introduction, or other human disturbances.

Individual Effects under Alternative C

Under Alternative C, as under Alternative B, the BLM would manage six areas containing wilderness characteristics. However, Alternative C would impose restrictions and stipulations in these areas, including closing mineral leasing and ROW exclusion zones, which would benefit rangeland vegetation. However, rangeland management actions would be restricted within areas with wilderness characteristics.

Individual Effects Alternative D

Under Alternative D, the BLM also would manage six areas containing wilderness characteristics. Depending on the restrictions implemented, access and uses of rangeland vegetation could be limited, which would protect vegetation but could limit management actions in areas. However, restrictions are unlikely to prevent management objectives from being achieved over the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

WWV sites could impact rangeland vegetation by allowing for more human disturbance of the sites over the long term. Direct impacts include trampling or destruction of vegetation, and indirect effects include soil compaction. This could result in reduced plant vigor or productivity.

Individual Effects under Alternative A

An unspecified number and location of WWV sites would be developed and maintained under this alternative. The magnitude of impacts would vary depending on the amount of WWV sites developed. Impacts are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative B

Six WWV sites would be maintained under Alternative B. Impacts would occur in these areas and are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative C

Impacts on rangeland vegetation are the fewest under this alternative since new routes through or near sensitive areas and increased traffic to remote areas would be avoided. This would reduce human disturbance, described under Effects Common to All Alternatives. However, impacts would still occur and are similar to those described under Effects Common to All Alternatives.

Individual Effects under Alternative D

Impacts are the same as those described under Alternative B.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There are no likely impacts on rangeland vegetation from public health and safety management actions.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Sustainable development management actions apply to areas that have already been developed and likely do not have rangeland vegetation. Because sustainable development management actions would involve facility reuse, new operations would not create new disturbance. As a result, there would be few impacts on rangelands from sustainable development actions.

Individual Effects under Alternative A

There are no actions under Alternative A that relate to sustainable development.

Individual Effects under Alternative B

Sustainable development actions would protect sensitive habitat from disposal. Where this includes rangelands, this would help to maintain the extent and connectivity of range vegetation in the WDO. ROW and mineral operation actions could impact rangelands by allowing some degradation during development. This could fragment and disturb native vegetation and directly impact vegetation health through trampling and vegetation removal. Indirect impacts include soil compaction and weed invasion.

Individual Effects under Alternative C

Sustainable development actions would protect sensitive habitat from disposal. Where this includes rangelands, this alternative would help to maintain the extent of rangeland vegetation in the WDO.

ROW and mineral operation actions would protect rangelands by preventing degradation and fragmentation during and after development. This could prevent direct effects, such as trampling and vegetation removal, and indirect effects, such as soil compaction and weed invasion.

Individual Effects under Alternative D

Impacts from sustainable development actions are the same under Alternative D as those described under Alternative B.

Cumulative Effects

Rangeland vegetation types are of increasing importance because much of what was historically grassland and shrubland of the cumulative impact assessment area has been heavily grazed or invaded by nonnative species such as cheatgrass.

Past, present, and reasonably foreseeable actions that are relevant to range management include land tenure changes, wildland fire and allowing fire for resource benefit and suppression, fuel and vegetation treatments, minerals management, population growth, recreational use, OHV use, watershed rehabilitation activities, regional planning efforts, weed management efforts, and wild horse and burro management and grazing. The types of impacts that have occurred and would continue to occur include additional removal or disturbance of vegetation, loss of plant diversity, continued invasive and noxious weed invasion, loss of soil integrity, changes in seral stage, reduction of forage for livestock and wildlife, changes in fire regime, and reduced ecosystem function.

Research projects are encouraged in the WDO to gain a better understanding of the ecological processes and improve rehabilitation and reclamation treatments. Research projects affect vegetation resources, and effects would vary depending on the size of the project and type of treatments implemented.

Areas where cross-country OHV use is allowed would be further restricted or eliminated under all of the Winnemucca RMP alternatives, except Alternative A. Closures directly affect rangeland vegetation by reducing disturbance and weed seed introduction. Although increasingly more OHVs

are in use throughout the cumulative impact area, the trend towards concentrating them into designated areas would enhance range management efforts in most habitat types by reducing the extent of disturbance and fragmentation. Reduction of CC and range management actions would reduce weed infestation and fuel load throughout the WDO. Since many rangelands are infested with weeds, this cumulative effect could be substantial throughout the cumulative impact area. Alternative D would offer the greatest amount of treatments, with Alternative C offering the least.

Cumulative effects are similar among the alternatives. Alternative B would contribute to more regional cumulative effects resulting from implementing actions. In general, Alternatives A, C, and D would provide more management measures than Alternative B that would directly or indirectly reduce the potential for cumulative impacts. The emphasis in Alternative D on actions that value multiple use with resource conservation and protection would have the least impact or risk of impacts on rangeland management and would contribute the least to cumulative impacts.

4.2.8 Vegetation—Riparian Habitat and Wetlands

Summary

This vegetative analysis is qualitative because specific impacts of resource activities on vegetation cannot be quantified. A more detailed analysis will follow at the implementation stage, such as an allotment evaluation and EA or a permit renewal EA to comply with NEPA. The greatest impact on riparian or wetland habitat within the WDO would be from wildland fire, livestock grazing, and wild horse and burro actions. There would be fewer impacts on riparian or wetland habitat from other resources, including soils, water, forest and woodland vegetation, weeds, chemical and biological control, rangeland vegetation, fish and wildlife, special status species, tribal consultation, visual resources, wilderness characteristics, mineral resources, recreation, renewable energy, transportation and access, lands and realty, ACECs/RNAs, backcountry byways, wild and scenic rivers, wilderness study areas, watchable wildlife viewing sites, and sustainable development. However, it is the BLM's judgment that several of the resources listed below are not likely to impact riparian or wetland habitat resources. These areas are air, cultural resources, geological resources, paleological resources, caves and karsts, national trails, and public health and safety.

Alternative C would provide the most protection to riparian and wetland vegetation by restricting treatments, activities, and OHV use in these areas. Alternative D would provide a more flexible approach by protecting these areas while allowing for multiple uses. Alternatives A and B would provide less protection for riparian and wetland areas.

Methods of Analysis

Methods and Assumptions

Impacts were identified using best professional judgment and were assessed according to the following methods and assumptions:

- Activities generally affect vegetation by changing plant composition, seral condition, structure, production, ground or canopy cover, and soil resources;
- Restoring riparian and wetland vegetation is assumed to include an improvement in species composition and structure, including stand density and age, where appropriate;

- Vegetation communities would be maintained with a mix of species composition, cover, and age classes within the site potential;
- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the WDO, recreational activities, wildlife and livestock grazing and their movements, and surface-disturbing activities;
- Noxious and invasive weeds would further expand into native plant communities, and disturbances to these communities would expand opportunities for the spread of nonnative invasive plant species; and
- The BLM would continue to treat noxious and invasive weeds and pests on public land and grazing allotments, and livestock permit holders, right-of-way holders, mineral lease claim, and permit holders would continue to treat noxious and invasive weeds and pests on public land, as stipulated within their permits and authorizations.

Some impacts are direct, while others are indirect and affect vegetation through a change in another resource. Direct impacts on riparian vegetation are disruption, trampling, or removal of rooted vegetation, resulting in a reduction in areas of native vegetation; mortality resulting from toxic chemicals; and actions that unequivocally reduce total numbers of plant species or reduce or cause the loss of total area, diversity, vigor, structure, or function of wildlife habitat.

Potential indirect impacts include loss of habitat suitable for colonization due to surface disturbance; introduction of noxious weeds by various mechanisms or conditions that enhance the spread of weeds; increased noise; and general loss of habitat due to surface occupancy or surface compaction. Indirect impacts include those that cannot be absolutely linked to one action, such as decreased plant vigor or health from reduced air or water quality.

Effects from Air Quality Management

Effects Common to All Alternatives

There are no likely impacts on riparian and wetland vegetation from air quality management.

Effects from Geology Management

Effects Common to All Alternatives

There are no likely impacts on riparian and wetland vegetation from geology resource management.

Effects from Soil Resources Management

Effects Common to All Alternatives

Soil erosion reduction measures, involving seeding and improving vegetative cover, would reduce compaction and increase infiltration, which would indirectly improve riparian and wetland health over the short term. As a result, vegetative productivity and diversity would be increased, which would increase litter, soil fertility, infiltration, and nutrient cycling in the long term.

Individual Effects under Alternative A

Impacts on riparian and wetland vegetation vary depending on the grazing management system, reclamation and rehabilitation treatments, and success or failure of the treatments. Impacts would be long term.

Individual Effects under Alternative B

Impacts from land reclamation or rehabilitation activities relating to soil resources management under Alternative B differ from Alternative A in that no native seed or native seedlings would be used for reclamation or rehabilitation activities.

Soil compaction prevention measures under Alternative B would seek to mitigate adverse effects without seasonal closures. As such, riparian and wetland vegetation would be impacted year-round, even during times when soils would be most susceptible to compaction. However, vegetation treatments could occur year-round, facilitating riparian and wetland rehabilitation and improvement and multiple uses in the long term.

Individual Effects under Alternative C

Land reclamation actions under Alternative C would have the greatest benefit to riparian and wetland areas by requiring reclamation of all surface-disturbing activities. This would allow for native vegetation reestablishment and would directly help to achieve riparian and wetland health goals in the long term.

Soil compaction prevention measures are the most stringent under Alternative C, providing for seasonal use restrictions. This would indirectly benefit riparian and wetland vegetation health by improving filtration and protecting soils when they are most susceptible to disturbance. In addition, riparian vegetation would improve through natural recovery; no structural improvements would be implemented under Alternative C.

Individual Effects under Alternative D

Land reclamation actions under Alternative D would provide the most flexible approach to land reclamation. Impacts on riparian and wetland vegetation would vary depending on how and if reclamation was achieved, including whether native or nonnative seeds were used in revegetating lands. Impacts would be long term.

Soil compaction prevention measures would implement seasonal use restrictions, which would occur on a case-by-case basis. Indirect impacts on riparian and wetland resources include improved health and vigor from decreased soil compaction and increased infiltration. Further, objectives such as restoration of PFC and multiple use could be achieved in the long term, as seasonal restrictions could be less limiting to riparian and wetland improvements.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from water resources management.

Individual Effects under Alternative A

Under this alternative, priority watersheds would not be established. However, impacts on water resources would be reduced by compliance with water quality regulations and implementation of BMPs and land health standards. This would indirectly protect riparian and wetland vegetation throughout the WDO, but would provide the fewest action- and location-specific protections of all alternatives.

Individual Effects under Alternative B

Priority watershed actions would limit disturbance, indirectly protecting riparian and wetland vegetation in those areas in the long term. This is because riparian and wetland areas within priority watersheds would be prioritized for fire suppression, and direct impacts on vegetation from wildfire, as described under Wildland Fire Management, would be minimized. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative C

Priority watershed actions under Alternative C would provide the greatest indirect protection to riparian and wetland vegetation within those areas by imposing the most restrictions. Exclusion of uses in these areas would allow natural processes to occur, thus improving riparian and wetland conditions. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Due to their restrictions, water resources actions may prevent multiple uses of riparian and wetland vegetation within priority watersheds.

Individual Effects under Alternative D

Priority watershed actions would indirectly protect riparian and wetland vegetation in the long term, as described under Alternative B. As avoidance areas, they may directly limit riparian treatments and prevent multiple uses. Mitigation measures would be implemented when avoidance is not possible, which would allow for some flexibility in achieving riparian rehabilitation and improvement goals. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

There are no effects common to all alternatives from forest and woodland product management.

Individual Effects under Alternative A

Fire would reduce the fuel load in forests and would have indirect impacts by preventing catastrophic fires that could spread to adjacent riparian and wetland areas. Other treatments would facilitate this enhancement, including fencing, mechanical control, and herbicides. Effects would be long term and localized.

Forest management for aspen and cottonwood, two riparian tree species, would directly help to achieve PFC and diversity, which ultimately would enhance riparian health in the long term.

Individual Effects under Alternative B

Fire would reduce the fuel load in forests and would have indirect impacts by preventing catastrophic fires that could spread to adjacent riparian and wetland areas. Other treatments would facilitate this enhancement, including fencing and mechanical, biological, and chemical control. Effects would be long term and localized.

Forest management for aspen and cottonwood would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Forest treatments would be the most limited under Alternative C with only mechanical and biological treatments permitted. As a result, fuel loads could increase, and catastrophic fires could spread to adjacent riparian and wetland areas. Effects would be long term and localized.

Forest management for aspen, cottonwood, willow, and alder would have greater impacts than under Alternative A, as more riparian species would be given specific management consideration.

Individual Effects under Alternative D

Use of fire and other treatments would reduce the fuel load in forests, preventing catastrophic fires that could spread to adjacent riparian and wetland areas. Impacts are similar to those described under Alternative B

Forest management for aspen, cottonwood, willow, and alder would have impacts similar to those described under Alternative C.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Actions to decrease weeds on BLM-administered lands would indirectly improve riparian and wetland health and habitat values by increasing native species and decreasing the risk of catastrophic wildfire in both the short term and long term. Such a fire could damage or kill native vegetation, could allow weeds to spread, and could destroy wildlife habitat.

Individual Effects under Alternative A

Controlling weeds with prescribed fire would directly disturb wildlife habitat in the short term, while in the long term achieving riparian and wetland health, structure, composition, and wildlife habitat goals more quickly. Prescribed fire is used mainly to control saltcedar and is not used to control weeds over large areas, so impacts would be localized and small scale. Approved biological controls are specific to target species, so there would be no impact on nontarget species. Chemical treatments would be applied according to label directions and following established guidelines, best management practices and standard operating procedures for application. Chemical applications would also be designed to avoid effects on nontarget species, which would be short term but would lead to long-term improvement in vegetation composition. Using Integrated Pest Management practices would make use of one, several, or all available management practices, such as chemical,

biological, mechanical, or prescribed fire, and would provide an adaptive and effective approach to weed management in riparian and wetland areas in the long term.

Preparing pesticide and biological use proposals, in addition to cooperation with agencies, would ensure that only safe and effective treatments would be used within the WDO. This would prevent impacts on nontarget species, including riparian vegetation.

Individual Effects under Alternative B

Impacts from weeds management actions are the same as those described under Alternative A.

Individual Effects under Alternative C

Mechanical and biological weed treatments would be used under Alternative C, which would indirectly help to achieve riparian and wetland health, composition, and wildlife habitat objectives in the long term by facilitating native vegetation establishment. Alternative C would not include prescribed fire as a weed management tool, which could limit effective control of saltcedar invasion in riparian woodlands. Approved biological controls are specific to target species, so there would be no impact on nontarget species. Further, preparing biological use proposals, in addition to cooperating with agencies, would ensure that only safe and effective treatments would be used within the WDO.

Using IPM practices would make use of one or both available management practices, such as biological or mechanical control to provide an adaptive and effective approach to control pest species and weeds in the long term.

Individual Effects under Alternative D

Impacts from weeds management actions are the same as those described under Alternative A.

Effects from Chemical and Biological Control

Effects Common to all Alternatives

Using chemical control methods would help control and reduce weed outbreaks. Effects would be indirect and are similar to those described under weeds management.

Individual Effects under Alternative A

Using both biological and chemical control methods, as well as IPM techniques, would provide an adaptive and effective approach to weed management in riparian and wetland areas in the long term. Preparing pesticide and biological use proposals, in addition to cooperation with agencies, would ensure that only safe and effective treatments would be used within the WDO. This would prevent impacts on nontarget species, including riparian vegetation.

Individual Effects under Alternative B

Effects from chemical and biological control are the same as those described under Alternative A.

Individual Effects under Alternative C

The focus on biological control methods would limit the effectiveness of weed management in riparian and wetland areas and would have an indirect effect in the long term under Alternative C. However, use of IPM techniques would also provide an adaptive and effective approach to weed management in the long term. Preparation of pesticide and biological use proposals, in addition to cooperation with agencies, would ensure that only safe and effective treatments would be used within the WDO. This would limit impacts on nontarget, native vegetation.

Individual Effects under Alternative D

Effects from chemical and biological control are similar to those described under Alternative A.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Vegetation treatments for rangeland improvement projects would reduce the prevalence of invasive species and would improve ecological conditions throughout a large portion of the WDO. Such projects would reestablish an understory of forbs and perennial bunchgrasses that are less susceptible to fire than invasive annuals, such as cheatgrass. This would reduce the risk of catastrophic wildfire on rangelands, which might otherwise spread into riparian and wetland areas. Effects would be indirect.

Individual Effects under Alternative A

CC would not be restored under this alternative, which would keep fuel loads high and would increase the risk for catastrophic fire, which could destroy adjacent riparian and wetland areas.

Individual Effects under Alternative B

Restoration of CC would have the greatest impact in decreasing fire fuel loads and could protect adjacent riparian and wetland areas from catastrophic fire in the long term.

Individual Effects under Alternative C

Option 1

Impacts on riparian and wetland vegetation from rangeland management actions are the same as those described under Alternative B.

Option 2

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would protect adjacent riparian and wetland areas from catastrophic fire. This would indirectly allow vegetative health and wildlife habitat objectives to be achieved in this area by maintaining established native vegetation.

Individual Effects under Alternative D

Impacts on riparian and wetland areas from rangeland management actions are the same as those described under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Specific objectives for meadows and riparian areas in implementation plans would prioritize restoration of these communities, making restoration efforts more effective and efficient. Riparian and wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This would result in the following:

- Reduce erosion and improve water quality;
- Filter sediment and capture bedload;
- Aid floodplain development;
- Improve floodwater retention and groundwater recharge;
- Develop root masses that stabilize stream banks against cutting action;
- Develop diverse ponding;
- 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.

Individual Effects under Alternative A

Alternative A would improve riparian and wetland habitat at the slowest rate since the PFC percentage goal would not be stated and the BLM would make progress toward PFC through a combination of grazing system changes and structures. Structural improvements would be maintained by grazing permittees, the WDO, and interest groups. Impacts would be direct and would vary depending on what percentage of these communities is restored.

Individual Effects under Alternative B

Alternative B would make progress toward PFC on 60 percent of the riparian and wetland habitat by 2028, primarily through structural improvements, such as fencing, water developments, and erosion control structures. Structural improvements would be maintained by the WDO and interest groups. Adaptive management would be emphasized through consultation, cooperation, and coordination with the affected interest groups. Impacts would be direct.

Individual Effects under Alternative C

Option 1

This option would achieve PFC on a minimum of 85 percent of the riparian and wetland habitat by 2028 through natural processes, limiting livestock by season of use (which is particularly important

in the hot season), limiting utilization of vegetation, and reduction in livestock numbers. No structural improvements would be built. Impacts would be indirect.

Option 2

This option would achieve PFC on a minimum of 85 percent of the riparian and wetland habitat by 2028 through natural processes and by eliminating livestock grazing within the WDO. This would have the greatest improvement in riparian and wetland habitat by eliminating impacts from livestock, such as soil compaction, vegetation utilization and trampling, and weed introduction or spread.

Individual Effects under Alternative D

Alternative D would achieve or make progress toward PFC on 85 percent of the riparian and wetland habitat by 2028 through natural processes and minor structural improvements. The direct impacts are similar to those under Alternative A. Structural improvements would be maintained by grazing permittees, the WDO, and interest groups. Adaptive management would be emphasized through consultation, cooperation, and coordination with the affected interest groups.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Improving aquatic habitats involves rehabilitating wetland and riparian vegetation in order to foster healthy aquatic communities by decreasing sedimentation and providing structural complexity, suitable water temperatures, canopy cover, and bank stabilization. Monitoring conditions and cooperating with agencies would ensure that habitat goals were met.

Actions to minimize erosion and sedimentation along access routes would indirectly benefit riparian and wetland vegetation by reducing soil disturbance and increasing infiltration. This would lead to improved plant vigor and productivity.

Individual Effects under Alternative A

Implementing an HMP would identify and prioritize areas for rehabilitation, providing a more direct, effective, and efficient riparian and wetland restoration and improvement strategy.

The FMUD process would identify mitigation measures that would minimize impacts on riparian and wetland vegetation.

Individual Effects under Alternative B

Coordination with agencies would identify and prioritize areas for rehabilitation, providing a more direct, effective, and efficient riparian and wetland restoration and improvement strategy.

Using Land Health Standards would identify mitigation measures that would minimize impacts on riparian and wetland vegetation.

Individual Effects under Alternative C

Coordination with agencies would have impacts similar to those described under Alternative B.

Using Land Health Standards would have impacts similar to those described under Alternative B.

Individual Effects under Alternative D

Coordination with agencies would have impacts similar to those described under Alternative B.

Use of Land Health Standards would have impacts similar to those described under Alternative B.

Effects from Special Status Species Management

Effects Common to All Alternatives

Special status species management across all alternatives would prevent activities that would lead to mitigation and monitoring, listing of species, plant inventories, and avoiding sage-grouse, pygmy rabbit, bat, and raptors. Such actions to avoid impacts on listed or sensitive species or their habitat could directly alter implementation or timing of vegetation management treatments. These requirements could also make vegetation treatments cost prohibitive. As a result, certain management goals may be precluded, but wildlife habitat would be protected. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

Management of occupied and potential LCT habitat, as described in Chapter 3, could restrict certain vegetation treatments that would occur in adjacent riparian areas, such as soil disturbance or use of chemicals. Impacts would vary with the type of treatment proposed and the nature and extent of the restrictions.

Maintaining and improving special status species habitat would improve riparian and wetland areas.

Individual Effects under Alternative A

Restrictions on actions near special status plants, sage-grouse and sage-grouse leks, pygmy rabbits, bat habitat, and raptors could directly impact management of riparian and wetland vegetation by limiting the type, timing, and location of treatments. However, special status species protections would also help create a lower level of disturbance in riparian and wetland areas, preventing indirect effects, such as additional soil disturbance and weed invasion, or direct disturbance to vegetation. Protections to special status species would be particularly effective, as many sensitive species are associated with wetland and riparian areas.

Individual Effects under Alternative B

Alternative B places the least stringent restrictions on actions near special status plants, sage-grouse and sage-grouse leks, pygmy rabbits, bat habitat, and raptors. However, special status species protections would still apply to riparian and wetland areas, as described under Alternative A.

Prescriptive grazing would be permitted in riparian and wetland areas. If applied correctly, this could be used as a tool to foster native vegetation growth and weed control, while minimizing impacts on soils. Effects would be long term.

Individual Effects under Alternative C

Alternative C places the greatest number of restrictions on activities that could occur near special status species and their habitats. Of all alternatives, Alternative C would be the most effective in preventing disturbance to wetland and riparian areas in the long term.

Option 1

Prescriptive grazing in exclosures closed to livestock grazing would be permitted in certain riparian and wetland areas. If applied correctly, this could be used as a tool to foster native vegetation growth and weed control, while minimizing impacts on soils. However, livestock would have some direct impacts on vegetation and soils in these areas. Effects would be localized and long term.

Option 2

Grazing would not be permitted under this option. This would have the greatest reduction in impacts on riparian and wetland areas of all alternatives by eliminating the effects from livestock, such as soil compaction, vegetation utilization and trampling, and weed introduction and spread.

Individual Effects under Alternative D

Restrictions to actions near special status species and their habitats would have impacts similar to those described under Alternative A.

Prescriptive grazing would have impacts similar to those described under Alternative B.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Direct impacts on riparian and wetland vegetation resulting from wild horse and burro management actions include browsing and breakage of riparian vegetation, which alters the amount, condition, production, and vigor of riparian vegetation in grazed areas. Overuse of riparian vegetation next to water sources, troughs, and stock reservoirs causes indirect effects, such as soil disturbance and compaction, and direct effects, such as a loss of plant cover, which usually results in localized areas being dominated by invasive plants. Wild horses and burros directly impact riparian vegetation around watering locations by trampling and grazing plants, which reduces riparian species cover and diversity. Protection and development of seeps and development of alternative water sources mitigate impacts of wild horses on riparian and wetland habitat. Vegetation recovery on burned areas could be slowed or reduced by wild horses and burros.

Wild horses and burros contribute to weed spread and introduction similar to impacts described under Effects Common to All Alternatives from Fish and Wildlife Management.

Individual Effects under Alternative A

Maintaining established AMLs as a population range, using gathers when AML is exceeded, and using fertility control inhibitors would be the most effective methods in maintaining WHB numbers within AML. This would reduce the impact of WHB on riparian and wetland vegetation by decreasing the risk of soil compaction, trampling, and weed spread or introduction.

WHB protections, such as limitations on such proposed activities as motor vehicle racing, would protect riparian and wetland vegetation and soils from disturbance and would prevent impacts due to human use, such as trampling and weed invasion.

Individual Effects under Alternative B

Impacts from population control measures under Alternative B are similar to those under Alternative A. AML reduction in response to decreased WHB private water supply would intensify these impacts.

Protection measures for WHB would have similar impacts on those described under Alternative A.

Individual Effects under Alternative C

Maintaining AML as a single number, using four-year (or longer) gather cycles, and not allowing use of fertility control inhibitors under Alternative C would cause the greatest impact from WHB on riparian and wetland areas by using less effective modes of WHB population control. However, AML reduction in response to decreased water availability for WHB would decrease impacts of WHB on riparian and wetland areas, since there would be fewer animals to cause impacts.

Protection measures for WHB would be the greatest under Alternative C and would prohibit or limit such activities as motor vehicle racing in HMAs, unless impacts were determined to be minimal. This would be most effective in protecting riparian and wetland vegetation and soils from disturbance and in preventing impacts due to human use, such as trampling, weed invasion, and litter.

Individual Effects under Alternative D

Impacts from population control measures and development of alternative water sources are similar to those described under Alternative A.

Impacts from WHB protection measures are similar to those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildland fires result in short-term loss of riparian and wetland vegetation and a long-term change of community composition. The vegetation response to fire depends on the size, location, intensity, season, timing, and amount of precipitation, preexisting plant community condition, and the abundance of noxious and invasive weeds in the area. Fires have direct effects by changing the composition of the plant community, delaying plant succession, and removing woody vegetation and plant litter. Wildland fires might burn with enough heat to kill soil organisms and root systems, resulting in diminished plant recruitment and growth rates, particularly for fire-sensitive species. Emergency stabilization and burned area rehabilitation treatments, such as seeding with native perennial species, would be implemented to restore degraded riparian and wetland vegetation and directly improve riparian and wetland health in the long term. Burn areas lacking perennial plant species for natural recovery could be seeded.

Wildland fires create an opportunity for noxious and invasive weeds to become established or spread by removing aboveground vegetation, leaving burned areas more susceptible to noxious and invasive weeds. Some species of noxious and invasive weeds respond well to post-fire conditions and outcompete native species. In areas where noxious and invasive weeds occur or are in close proximity, wildland fire increases the likelihood of weed expansion. Firefighters and their equipment might also introduce or spread noxious and invasive weeds. Some mechanical controls disturb the soil surface and remove vegetation, creating an opportunity for noxious and invasive weeds to become established or to spread.

Suppressing wildfire and creating fuel breaks would prevent catastrophic destruction of riparian and wetland areas and would preserve native vegetation and diversity in these areas over the long term. Surface disturbance resulting from fire line construction, use of heavy equipment, and other fire suppression activities would have direct effects by damaging vegetation and indirect effects by accelerating soil erosion in localized areas. However, these areas would be rehabilitated to minimize long-term impacts.

Because fire retardants are composed largely of nitrogen and phosphorus fertilizers, they may encourage growth of some species at the expense of others, resulting in changes in community composition and species diversity. Differential growth may also influence herbivorous behavior; both insect and vertebrate herbivores tend to favor new rapidly growing shoots.

Fuels management actions would result in short-term direct loss of vegetation on a small scale. Projects would reestablish desirable vegetative communities, providing for healthy, diverse riparian and wetland areas over the long term. These actions would allow fire to play its natural role more frequently and would reduce the likelihood of catastrophic wildfire, which would protect native riparian and wetland vegetation in the long term and over large areas.

Implementing a response to wildfires based on social, legal, and ecological consequences of the fire would indirectly protect riparian and wetland resources from catastrophic fire, which would protect vegetation and foster rehabilitation and improvement of riparian and wetland areas.

Individual Effects under Alternative A

No additional impacts would occur from wildland fire management actions under Alternative A.

Individual Effects under Alternative B

Under this alternative, 110,167 acres of land would be designated as suitable for allowing fire for resource benefit. These areas would be more vulnerable to weed invasion, which would have indirect effects by degrading riparian and wetland areas and preventing the establishment of native vegetation. However, because many of the areas are higher elevation woodland areas, impacts on riparian and wetland areas would be minimized.

Individual Effects under Alternative C

No additional impacts would occur from wildland fire management actions under Alternative C.

Individual Effects under Alternative D

Under Alternative D, 9,932 acres of land would be designated as suitable for allowing fire for resource benefit. Impacts are similar to but less than Alternative B because Alternative D has fewer acres designated for allowing fire for resource benefit.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Cultural resources are not likely to impact riparian or wetland habitat resources.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consulting with tribes to identify culturally significant plants, important habitats, and traditional use locations would emphasize protection of natural resources, including riparian and wetland areas. This would indirectly limit disturbance to soils and riparian vegetation over the long term in certain areas. Consultation could place higher treatment priority in areas not previously identified or could limit actions in planned treatment areas. Impacts would vary on a case-by-case basis and are likely to be localized.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Paleontological resources are not likely to impact riparian or wetland habitat resources.

Effects from Visual Resources Management

Effects Common to All Alternatives

Implementing VRM guidelines, particularly managing WSAs as Class I, would increase the difficulty of accomplishing vegetation management actions and may affect the dimensions and locations of riparian and wetland treatments. This is because such vegetation treatments could change the visual character of riparian and wetland areas. However, because most of the vegetation management is through natural processes to improve riparian conditions, VRM should improve.

Individual Effects under Alternative A

Under Alternative A, 420,271 acres and 346,302 acres would be managed to VRM Class I and II guidelines, respectively. These actions would limit the scope of activities in riparian and wetland areas and would prohibit treatments and prescriptions that would change the visual character. Overall, meeting VRM Class I and II guidelines would increase the difficulty of rehabilitating and improving riparian and wetland areas within these areas over the long term.

Individual Effects under Alternative B

Under Alternative B, 417,605 acres and 391,203 acres would be managed to VRM Class I and II guidelines, respectively. This alternative is the least restrictive to implementation of riparian and wetland rehabilitation efforts. Impacts are similar to those described under Alternative A.

Individual Effects under Alternative C

Under Alternative C, 417,605 acres and 3,083,211 acres would be managed to VRM Class I and II guidelines, respectively. This alternative would have the greatest overall benefit to riparian and wetland habitats by improving riparian and wetland conditions through natural processes.

Individual Effects under Alternative D

Under Alternative D, 417,605 acres and 2,780,416 acres would be managed to VRM Class I and II guidelines, respectively. Impacts would be most similar in nature and magnitude to those described under Alternative C.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

There are no likely impacts on riparian and wetland vegetation from cave and karst resource management.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

There are no effects common to all alternatives from livestock grazing management.

Individual Effects under Alternative A

Negative impacts on riparian and wetland vegetation can result from ineffective livestock grazing management, which alters the amount, condition, production, and vigor of riparian vegetation in grazed areas. Impacts from grazing are usually related to a long duration of use during the growing season, especially hot season use, resulting in lower vigor of grazed species and a change in species composition. Overuse of riparian and wetland vegetation next to water sources, troughs, and stock reservoirs often cause soil disturbance and a loss of plant cover. Livestock directly impact riparian vegetation around watering locations by trampling and grazing plants, which reduces riparian species cover and diversity. Livestock contribute to the spread of weeds as described under Effects Common to All Alternatives from Fish and Wildlife.

Livestock grazing management can be utilized to provide positive impacts by applying a shortened season of use during the hot season, no hot season use, or fall or winter use.

Under Alternative A, 8,232,717 acres of land would be open to grazing, which would have the greatest impact on riparian and wetland areas. Grazing, including grazing on acquired lands, allowing temporary nonrenewable use, and allowing for three consecutive years of grazing would facilitate intensive land use. This would cause riparian and wetland vegetation to become less healthy, diverse, productive, and resilient in the long term.

To minimize impacts, grazing management strategies, such as rotation, deferment, rest from use, and the manipulation of season of use and grazing intensity, would be implemented. These strategies would help to manage composition, cover, and the vigor of riparian vegetation. The objective of these strategies is to maintain or reach rangeland standards for wetland and riparian areas. The

response of riparian and wetland vegetation to these strategies would be monitored, and adjustments would be made accordingly to achieve the desired response. The use of riparian pastures and exclosures increases the density, age class, and cover of desirable riparian plants, including willow, cottonwood, and herbaceous wetland and riparian plants.

Lands closed to grazing on the remainder of land in the WDO would lower impacts on riparian and wetland vegetation in these areas, as livestock would not be compacting soils, disturbing native vegetation, or acting as a mechanism for seed dispersal.

Individual Effects under Alternative B

Under Alternative B, 8,232,727 acres of land would be open to grazing, which would have the greatest impact on riparian and wetland areas, as under Alternative A . Grazing, including grazing on acquired lands, allowing temporary nonrenewable use, and allowing continuous season-long use would facilitate intensive land use. Impacts are similar to those described under Alternative A.

Grazing management strategies would have impacts similar to those described under Alternative A.

Lands closed to grazing on the remainder of land in the WDO would lower impacts on riparian and wetland vegetation in these areas, as livestock would not be compacting soils, disturbing native vegetation, or acting as a mechanism for seed dispersal.

Individual Effects under Alternative C

Option 1

Livestock grazing would be open on 8,038,084 acres of land, which would have impacts similar in nature to those in Alternative A. However, Alternative C, Option 1 would not allow grazing on acquired lands or temporary nonrenewable use and would only allow for two years of consecutive grazing during the critical growth period. This would cause fewer impacts on riparian and wetland vegetation.

Lands closed to grazing on the remainder of land in the WDO would lower impacts on riparian and wetland vegetation in these areas, compared with Alternatives A and B.

Grazing management strategies would have impacts similar to those described under Alternative A.

Option 2

Livestock grazing would be closed on all lands within the WDO, which would have the greatest impact of all grazing alternatives in reducing effects on riparian and wetland vegetation on BLM-administered lands.

Individual Effects under Alternative D

Alternative D would have 8,016,754 acres of land open to grazing. Impacts are similar to those described under Alternative A, except with fewer acres of land open to grazing.

Effects from Minerals Management

Effects Common to All Alternatives

General

Impacts on riparian and wetland vegetation could result from fluid, leasable, and locatable mineral development and mineral material sales and disposal. Most minerals management impacts on vegetation are on the sagebrush and saltbush scrub communities, so impacts on riparian and wetland vegetation are minimized. Direct impacts associated with these actions include loss or injury of plants due to excavation and toxic responses from chemical use in mineral extraction or waste pits; indirect effects include increased exposure to dust and other contaminants associated with construction of infrastructure and use of access roads. In the worst-case scenario, all vegetation would be removed from a parcel of land and the site would be permanently altered. Regulations, although they might differ among the mineral categories, are in place to protect vegetative communities and to ensure reestablishment of riparian and wetland vegetation following completion of the mineral and fluid management actions. Overall, riparian and wetland vegetation could be altered by minerals management actions, but mitigation measures would be implemented to lessen the impact on vegetation resources.

RFDs

Under the reasonably foreseeable development scenario, riparian and wetland vegetation would be protected because current mining activities cannot release effluent to degrade waters of Nevada. However, toxic runoff from abandoned mine sites may have impacts on riparian and wetland vegetation by decreasing plant vigor, which would make vegetation more susceptible to disease and mortality.

Individual Effects under Alternative A

Alternative A would open the greatest acreage and would close the least acreage to mineral development, thus having the greatest likelihood to impact riparian and wetland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative B

Compared with Alternative A, Alternative B would open fewer acres and would close more acres to mineral development, thus having a lower likelihood to impact riparian and wetland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative C

Alternative C would open the fewest acres and would close the most acres to mineral development, thus having the lowest likelihood to impact riparian and wetland vegetation of all alternatives. Impacts would be similar to those described under Effects Common to All Alternatives from Minerals Management.

Individual Effects under Alternative D

Compared with Alternatives A and B, Alternative D would open fewer acres and would close more acres to mineral development, thus having a lower likelihood to impact riparian and wetland vegetation. Impacts are similar to those described under Effects Common to All Alternatives from Minerals Management.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Managing BLM-administered lands to provide dispersed recreation could impact riparian and wetland vegetation throughout the WDO directly through human trampling or removal of vegetation and indirectly through weed introduction or spread.

OHV use would result in direct impacts on vegetation, such as reduced vegetative cover and density, as well as indirect effects, such as soil compaction and increased dust. OHV users would introduce and spread noxious and invasive weed seeds from their vehicles, shoes, clothing, and recreation equipment. OHV activities in undisturbed and remote areas could distribute weed seeds into weed-free areas. These effects could decrease plant vigor and productivity, could alter community plant composition.

To manage OHV use, the Transportation Plan would be updated and would account for wildlife habitat and riparian and wetland areas. NEPA analysis would be done on specific sites to minimize impacts on riparian and wetland vegetation.

Individual Effects under Alternative A

Under Alternative A, there would be no camping limitations or prohibitions throughout the WDO. In addition, the Pine Forest SRMA would be maintained, and issuance of special recreation permits would be the least restricted. The greatest acreage (6,782,790 acres) would be open to OHVs under Alternative A, with the least amount of land (416,652 acres) limited, and with 24,832 acres closed. Combined, these actions could degrade riparian and wetland vegetation throughout the WDO through human overuse, vegetation trampling, soil compaction, and weed introduction or spread.

Individual Effects under Alternative B

Camping limitations and prohibitions throughout the ERMA would minimize impacts on riparian and wetland areas on these lands. In addition, designation of three SRMAs would impact riparian and wetland vegetation to varying degrees depending on the recreation market identified for the SRMA. For example, the Nightingale SRMA would be targeted for undeveloped recreation-tourism, which would have less of an impact than the Pine Forest SRMA, which allows for increased motorized vehicle access. Under Alternative B, 1,460,200 acres would be open to OHVs, with the least amount of land (24,832 acres) closed, and with 5,445,218 acres limited. Together, effects from these actions could impact riparian and wetland areas throughout the ERMA, SRMAs, and OHV routes, as described under Alternative A. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed.

Issuance of special recreation permits would be the least restricted under this alternative, which could cause some impacts on riparian and wetland vegetation through increased human use, vegetation trampling, litter, and weed introduction.

Individual Effects under Alternative C

Camping limitations and prohibitions throughout the ERMA would minimize impacts on riparian and wetland vegetation on these lands. In addition, designation of two SRMAs would have impacts on riparian and wetland vegetation similar to those described under Alternative B. Under Alternative C, 0 acres would be open to OHVs, with 61,427 acres closed and 7,143,177 acres limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. As such, impacts from recreation actions would be fewest under Alternative C, as it is the most restrictive and prohibitive. However, impacts would occur, and they are similar to those described under Alternative A.

Issuance of special recreation permits would be the most restrictive under Alternative C and would cause the fewest impacts on riparian and wetland areas through increased human use, vegetation trampling, litter, and weed invasion.

Individual Effects under Alternative D

Camping limitations and prohibitions throughout the ERMA would minimize impacts on riparian and wetland vegetation on these lands. In addition, designating three SRMAs would have the same impacts on riparian and wetland vegetation as those described under Alternative B. Under Alternative D, 289,932 acres would be open to OHVs, with 35,483 acres closed and 6,878,592 acres limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan is updated and site-specific NEPA analysis is completed. Together, impacts from these actions are similar to those described under Alternative A.

Issuance of special recreation permits would cause some impacts on riparian and wetland areas through increased human use, vegetation trampling, litter, and weed invasion.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Direct impacts on riparian vegetation could occur with issuance of new ROWs, which require vegetation clearing and access roads and would disturb or destroy vegetation. Indirectly, ROWs may spread or introduce weeds, thereby reducing riparian habitat health and diversity. However, BMPs, stipulations, and mitigation measures would be implemented, which would minimize impacts on riparian vegetation.

Individual Effects under Alternative A

Maintaining existing exclusion areas within the WDO could limit the type and timing of treatments and multiple use activities within riparian and wetland areas. However, this action would protect and limit disturbance to vegetation and soils and would prevent weed invasion or spread caused by development.

Individual Effects under Alternative B

Designating avoidance areas within the WDO could limit the type and timing of treatments and multiple use activities within riparian and wetland areas. However, this action would protect and limit disturbance to vegetation and soils and would prevent weed invasion or spread caused by development.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones within the WDO would have the greatest impact on riparian and wetland areas by protecting and limiting disturbance to vegetation and soils and by preventing weed invasion or spread. However, these actions could limit the type and timing of treatments and multiple use activities within riparian and wetland areas.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones within the WDO would impact riparian and wetland areas by protecting and limiting disturbance to vegetation and soils and by preventing weed invasion or spread. However, these actions could limit the type and timing of rehabilitation treatments and multiple use activities within riparian and wetland areas.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Maintaining roads would allow access to riparian and wetland areas and would allow for wildfire management and suppression, when necessary. This would protect native vegetation and would help achieve riparian and wetland rehabilitation goals in the long term.

Road and trail construction could directly impact riparian and wetland areas through vegetation removal and could cause indirect impacts through soil compaction, weed invasion, and dust proliferation. This could reduce plant diversity and vigor in the long term.

Noxious weed control measures would prevent weeds spreading into riparian and wetland areas, would prevent competition with native species, and would indirectly help rehabilitate and improve riparian and wetland communities.

Individual Effects under Alternative A

Riparian and wetland areas could be impacted by road and trail construction. However, improved and increased access to certain areas would facilitate restoration and improvement of riparian and wetland vegetation and would allow for multiple uses.

Individual Effects under Alternative B

Riparian and wetland areas could be impacted from road or trail construction. However, these actions could limit access to certain riparian and wetland areas for rehabilitation efforts and would prevent multiple uses in certain areas.

Individual Effects under Alternative C

Transportation actions could limit access to riparian and wetland areas for management and could prevent multiple uses in certain areas.

Individual Effects under Alternative D

Impacts from transportation actions are similar to those described under Alternative C.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Land and realty management actions would result in short-term direct effects through surface disturbance and vegetation removal and indirect effects through increased susceptibility to weed invasion or the spread of existing weed patches. Disturbed areas would be reclaimed and seeded. Land sales could affect riparian vegetation by changes in vegetative cover through urbanization or agricultural or industrial development.

Vegetation and wildlife habitat value would be given consideration when the WDO makes disposal and acquisition decisions. Impacts on riparian and wetland vegetation would vary on a case-by-case basis, but impacts should be minimized since only lands with little resource values would be identified for disposal, and further NEPA documentation would minimize potential impacts on riparian and wetland vegetation. Acquisition of riparian and wetland areas would provide additional opportunities to achieve riparian and wetland vegetation objectives.

ROWs alter habitat with the footprint for the facilities that they authorize. ROWs could have direct effects by removing vegetation and indirect effects by compacting soil, causing weed invasions, and increasing dust in these areas. Most of the footprints are localized and cover a small area, but ROWs tend to be linear and may stretch for miles. Many of the impacts associated with ROWs can be mitigated on a case-by-case basis.

Individual Effects under Alternative A

Issuance of ROWs would not be limited, and avoidance areas or exclusion zones for lands and realty management actions would not be designated under Alternative A. No restrictions would be placed on land treatments, thus allowing for rehabilitation and improvement actions and subsequent achievement of PFC and multiple use goals.

Individual Effects under Alternative B

Designating avoidance areas would have similar impacts as renewable energy management actions under Alternative B.

Issuance of ROWs would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones would have similar impacts as renewable energy management actions under Alternative C.

Restriction on ROW issuance could impact riparian and wetland areas by protecting and limiting vegetation disturbance, fragmentation, and weed invasion or spread from road construction. However, this action could limit implementation of rehabilitation treatments and could prevent multiple uses in certain areas.

Individual Effects under Alternative D

Designation of avoidance areas and exclusion zones would have similar impacts as renewable energy management actions under Alternative D.

Issuance of ROWs would have impacts similar to those described under Alternative A.

Effects from ACEC/ RNA Management

Effects Common to All Alternatives

There are no effects common to all alternatives from ACEC/RNA management.

Individual Effects under Alternative A

Maintaining the Osgood Mountain Milkvetch ACEC would have no effect on riparian and wetland areas.

Individual Effects under Alternative B

Effects from ACEC management under Alternative B are the same as those described under Alternative A.

Individual Effects under Alternative C

Designating four ACECs within the WDO would provide the greatest protection to native vegetation and would prevent disturbance and fragmentation of riparian and wetland areas within these ACECs by limiting human uses in these areas. However, implementation of certain rehabilitation treatments could be limited in areas, depending on habitat sensitivity.

Individual Effects under Alternative D

Effects from ACEC management under Alternative D are the same as those described under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways may attract more tourism to areas they access and could increase human use and degradation of nearby riparian and wetland areas. The only BCB is the Lovelock Cave BCB, but expanding BCBs could have a greater impact on riparian and wetland areas. Impacts would vary, depending on the locations of new BCBs and the areas they would access.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts from national trails management because these actions would not affect riparian and wetland vegetation management.

Effects Common to All Alternatives from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no effects common to all alternatives from wild and scenic rivers management.

Individual Effects under Alternative A

No WSRs would be managed under Alternative A. Without WSRs, there would be less protection given to rivers or riparian areas within the WDO; as such, impacts on vegetation and soils would not be restricted, including those from increased use, such as soil compaction, weed introduction, and trampling. However, riparian and wetland rehabilitation treatments would not be restricted, allowing for achievement of PFC and multiple uses.

Individual Effects under Alternative B

No WSRs would be managed under Alternative B, and impacts are the same as those under Alternative A.

Individual Effects under Alternative C

WSRs would be managed under Alternative C and would limit other uses, such as recreation and development. As a result, there would be limited impacts on riparian and wetland areas. Vegetation treatments would also be restricted, potentially preventing rehabilitation treatments and multiple uses.

Individual Effects under Alternative D

No WSRs would be managed under Alternative D, and impacts are the same as those under Alternative A.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

As protected areas, WSAs would prevent disturbance to native vegetation in certain riparian and wetland areas within the WDO. However, WSA to WA designations would impact vegetation treatments on these lands, preventing riparian and wetland health goals from being achieved in localized areas in the long term.

Individual Effects under Alternative A

Alternative A would be the least restrictive to structural improvements within areas with wilderness characteristics. In addition, grazing management and progress toward or maintaining PFC would improve riparian areas within WSAs.

Individual Effects under Alternative B

Requirements for nonimpairment of WSAs would minimize impacts on riparian areas within WSAs.

Under Alternative B, the BLM would manage six areas containing wilderness characteristics to meet multiple use and sustained yield objectives. This would allow management objectives to be achieved over the long term but could allow some impacts on riparian and wetland vegetation by allowing multiple uses.

Individual Effects under Alternative C

Under Alternative C, as under Alternative B, the BLM would manage six areas containing wilderness characteristics. However, this alternative would impose restrictions and stipulations in these areas, including closure to mineral leasing and ROW exclusion zones. This could limit riparian improvements in certain areas, but such restrictions would have the greatest improvement in riparian condition by minimizing disturbance caused by human use, recreation, and development.

Individual Effects under Alternative D

Alternative D would also manage six areas containing wilderness characteristics. Depending on the restrictions implemented, some riparian improvements could be limited, but restrictions are unlikely to prevent management objectives from being achieved over the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

There are no likely impacts on riparian and wetland vegetation from watchable wildlife viewing sites management.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There are no likely impacts on riparian and wetland vegetation from public health and safety management.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Sustainable development management actions apply to areas that have already been developed and likely do not have riparian or wetland vegetation. Because sustainable development management actions would involve facility reuse, new operations would not create new disturbance. As a result, there would be few impacts on riparian and wetland areas from sustainable development actions.

Cumulative Effects

Past actions that are relevant to riparian resources in the cumulative impact area include land tenure changes, wildland fire, allowing fire for resource benefit, suppression, fuel and vegetation treatments, saleable minerals, population growth, urban development, recreational use, OHV use, stream and watershed rehabilitation activities, regional planning efforts, weed management efforts, and grazing. The types of impacts that have occurred would be rehabilitated and mitigated to prevent future damage to riparian resources, preventing loss of plant diversity, changes to canopy structure, loss of soil integrity, reduced riparian function, and enhanced weed control efforts.

Watershed rehabilitation efforts throughout the planning area would result in improvements to riparian areas. Alternative C would include the greatest number and acres of rehabilitation and conservation watersheds and would contribute most to this trend. Because long-term wildfire suppression has led to circumstances where stand-replacing wildfire can occur and severely affect riparian resources, regional fire planning on the part of various land-management agencies, along with implementation of individual fire plans, would directly influence riparian health in the cumulative impact area, with those plans that promote a return to a natural fire regime leading to highest riparian health. Increased population makes the use of wildfire for resource benefits more difficult than in other, less-populated areas. Increased fuels treatments, although generally carried out in non-riparian areas, would indirectly affect riparian resources by reducing potentially stand-replacing wildfires.

Cumulative effects are similar among the alternatives. Alternative A would contribute to more regional cumulative effects resulting from open OHV use, and wildland fire suppression. In general, Alternatives B, C, and D would provide more management measures than Alternative A that would directly or indirectly reduce the potential for cumulative impacts. However, each of these alternatives also would implement fuel-reduction treatments. These measures could contribute to cumulative impacts on riparian resources. The emphasis in Alternative C on actions that value resource conservation, protection, and minimal human intervention would have the least impact or risk of impacts on riparian resources and would contribute the least to cumulative impacts. Overall, the actions proposed under any of the alternatives would not contribute to effects on a planning area-wide scale.

4.2.9 Fish and Wildlife

Summary

Impacts on fish and wildlife resources in the WDO from other management programs include loss or alteration of native habitats, decreased food and water availability and quality, increased habitat fragmentation, changes in habitat and species composition, interruption of travel corridors, and disruption of species behavior, leading to reduced reproductive fitness or increased susceptibility to predation, and direct mortality. Surface-disturbing actions that alter vegetation characteristics (e.g., structure, composition, and production) can affect habitat suitability for fish and wildlife, particularly where the disturbance removes or reduces cover and food resources. Even minor changes to vegetation communities can affect resident wildlife populations.

The direct and indirect impacts of management actions on fish and wildlife resources may vary widely, depending on a variety of factors, such as the dynamics of the habitat (e.g., community type,

size, shape, complexity, seral state, and condition), season, intensity, duration, frequency, and extent of the disturbance, rate and composition of vegetation recovery, change in vegetation structure, type of soils, topography and microsites, animal species present, and the ability of fish or wildlife species to leave or recolonize a site after a disturbance.

Proposed management practices can mitigate many of the effects from these actions. Alternative C would best manage habitat to maintain biological diversity of wildlife, followed by Alternatives D, B, and then A. Although Alternative B is the resource use alternative, it includes more proactive resource management and conservation measures for fish and wildlife than under the No Action Alternative (Alternative A).

Methods of Analysis

Methods and Assumptions

Fish and wildlife health within the WDO is directly related to the overall ecosystem health, habitat abundance, habitat fragmentation, and wildlife security provided, and thus most resource management actions have at least an indirect effect on fish and wildlife. Impact analysis on fish and wildlife resources included an assessment of whether each action would result in the possible destruction, degradation, or modification of habitat, as well as impacts that could improve wildlife and aquatic habitat. A large proportion of actions under all alternatives are mitigation measures for other actions and protective measures, so that many of the individual actions could improve habitats or the health of populations, depending on the success of the action when completed. The degree of impact attributed to any one management action or series of actions is influenced by the watershed, time, and degree of action, existing vegetation, and precipitation. Quantifying these impacts is difficult due to the lack of monitoring data for most species. In absence of quantitative data, best professional judgment was used, according to the following assumptions:

- Success of mitigation depends on specific protective measures, past results, and the assumption that proper implementation of such would take place;
- Implementation-level actions will be further assessed at an appropriate spatial and temporal scale and level of detail;
- Additional field inventories could be needed to support implementation-level decisions, which may be subject to further analysis under NEPA;
- The BLM would continue to manage fish and wildlife habitats in coordination with the Nevada Department of Wildlife; and
- The health of fisheries within the WDO is directly related to the overall health and functional capabilities of riparian and wetland resources, which in turn are a reflection of watershed health. Any activities that affect the ecological condition of the watershed and its vegetative cover would directly or indirectly affect the aquatic environment. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. As riparian systems adjust in response to the removal of vegetation or changes in hydrologic conditions, the availability of habitats required to fulfill the life history requirements of fish populations might be affected.

This impact analysis identifies both enhancing and improving effects to a resource from a management action as well as those that could degrade a resource. However, the evaluations are confined to those actions that have direct, immediate, and more important effects on the planning area, instead of identifying and evaluating all possible interactions, including those that are minor, and cause-effect relationships.

Because some species of fish and wildlife are also considered special status species, only impacts on fish and wildlife that do not have special status are discussed in this section. Impacts on federally listed, proposed, candidate, state threatened or endangered, or BLM sensitive species are addressed in the Impacts on Special Status Species section.

Effects from Air Quality Management

Effects to All Alternatives

Impacts on fish and wildlife are not likely to occur from air quality management.

Effects from Geology Management

Effects Common to All Alternatives

There are no identified effects common to all alternatives from geologic resource management.

Individual Effects under Alternative A

Impacts on fish and wildlife are not likely to occur under Alternative A.

Individual Effects under Alternative B

Management actions for geological resources would provide various degrees of wildlife and fish protection through habitat preservation that minimizes vegetation loss and erosion by restricting disruptive activities, including those that disturb the surface. Direct adverse impacts from geological management, such as surface-disturbing exploratory activities, are expected to be localized and limited to wildlife with very small home ranges, such as rodents and reptiles.

Individual Effects under Alternative C

Effects are the same as those described under Alternative B.

Individual Effects under Alternative D

Effects are the same as those described under Alternative B.

Effects from Soil Resources Management

Effects Common to All Alternatives

Under all alternatives, wildlife habitat would be indirectly conserved via conservation measures to prevent erosion and other degradations to soil, which in turn diminishes impacts on vegetative cover and thus wildlife habitats. Preventing sedimentation in water courses also can improve the health of fish and other aquatic species populations. Maintaining soil processes and their components, such as litter, appropriate vegetation, and good infiltration, is important to land health which is directly

related to habitat quality. Implementation of BMPs for soil-disturbing activities and application of reclamation measures to mitigate adverse impacts on soils and water add additional actions that could benefit wildlife and their habitats. The BMPs could prevent additional soil-disturbing activities that could encourage healthy vegetation communities, which are the foundation of wildlife habitats. Reclamation measures further restore wildlife habitats that have already been impacted. Although there may be nonnative species in some seed mixes, some wildlife habitat would be provided as opposed to leaving a site to revegetate with invasive weeds.

Individual Effects under Alternative A

There are no soil compaction prevention measures under Alternative A. This would impact wildlife habitat because soil compaction prevents water infiltration and therefore may affect vegetative health and vigor. However, there would be no restrictions on habitat improvement treatments in the long term.

Individual Effects under Alternative B

Soil compaction prevention measures under Alternative B would seek to mitigate adverse effects without seasonal closures. As such, wildlife habitats would be impacted year-round, even during times when soils would be most susceptible to compaction. However, habitat improvement treatments could also occur year-round and could disturb wildlife in the short term. These treatments would restore suitable habitat for wildlife in the long term.

Individual Effects under Alternative C

Soil compaction prevention measures are the most stringent under these two alternatives, providing for seasonal use restrictions. This would benefit wildlife habitat value by preventing compaction but would limit when habitat improvement treatment could occur. Impacts would be long term.

Individual Effects under Alternative D

Soil compaction prevention measures would implement seasonal use restrictions, which would occur on a case-by-case basis. Impacts include improved vegetative health and vigor from decreased soil compaction and increased infiltration, which would improve habitat value in the long term.

Effects from Water Resources Management

Effects Common to All Alternatives

Effective watershed management, which minimizes erosion and maintains hydrologic flow and vegetative community health, would result in healthy and diverse plant communities, which in turn provide wildlife habitat, especially in riparian areas. Healthy watersheds improve fish habitat and promote healthy fish populations.

Acquiring water rights that provide water to wildlife and acquiring water rights associated with in-stream flows would benefit wildlife since water is a crucial habitat component.

Individual Effects under Alternative A

Effects are the same as those listed under Effects Common to All Alternatives.

Individual Effects under Alternative B

Managing priority watersheds by implementing land health standards, BMPs, and mitigation measures add additional actions that could benefit wildlife and their habitats, including special status species, over Alternative A. These actions could prevent additional degradation of water resources and could lead to healthier vegetation communities, which are the foundation of wildlife habitats.

Water importation and exportation projects could negatively affect the location, quantity, and quality of water resources. This would have direct effects on wildlife by limiting and degrading the water supply, as well as indirect impacts that would occur from altering water resources that supply their habitat.

Individual Effects under Alternative C

Alternative C includes the most thorough and protective list of BMPs and reclamation measures and emphasizes use of natural or organic materials. Alternative C also provides the most protection of wildlife and habitats of all alternatives. The alternatives do this by establishing priority watersheds as exclusion areas for incompatible discretionary actions and by placing limitations on water projects to ensure water is available to wildlife and to maintain habitat.

Individual Effects under Alternative D

Alternative D includes a more thorough and protective list of BMPs and reclamation measures and would provide for more protection of wildlife and habitats than would Alternatives A and B. Management actions pertaining to priority watersheds and water projects are less stringent than under Alternative C.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

Managing stand health and providing various age classes within a stand would benefit wildlife, particularly migratory birds, by providing habitat quality and diversity within a habitat used by multiple species.

Potential impacts on fish and aquatic habitat associated with forest management include increased sedimentation from surface-disturbing activities and changes in water temperatures. Increased sedimentation in streams can affect fish populations in a variety of manners, including direct mortality, reduction in suitable spawning gravels, death of eggs, and displacement of individual fish. Excessive sedimentation could alter stream flow. Increases in water temperature can occur in areas where streamside vegetation is removed or altered flow regimes exist, increasing the amount of sunlight reaching the water or reducing summer base flow conditions. As water temperature increases, the amount of available dissolved oxygen for fish and aquatic invertebrates decreases.

The extent of forests and woodlands within the WDO is limited. As such, impacts on fish and wildlife from forest and woodland product management actions would be limited and localized. However, since this habitat type is limited within the WDO landscape, quality habitat in forest and woodlands is important to wildlife that use these areas.

Individual Effects under Alternative A

Firewood and Christmas tree harvesting and pinyon nut collecting would have localized impacts on wildlife. Impacts would generally be in the form of disturbance to breeding, feeding, or sheltering activities. Harvesting trees would be prohibited within 100 feet of springs and riparian areas of the existing harvest areas of Stillwater Range and Yellowstone Canyon, reducing the potential effect of these activities on aquatic resources in these areas.

Prioritizing various tree stands for fire suppression would be important to wildlife, particularly migratory birds, in order to maintain availability of a habitat type that is limited within WDO.

Individual Effects under Alternative B

Removal of pinyon pine and juniper from invaded sites may facilitate reestablishment of sagebrush communities, benefiting wildlife that depend on these communities. Additionally, controlling pinyon pine and juniper on invaded sites would prevent further encroachment on sagebrush communities.

Prioritizing various tree stands for fire suppression would have the same impacts as those under Alternative A.

Impacts resulting from commercial harvest of pinyon nuts, firewood and posts, and Christmas trees could lead to long-term or permanent loss of habitat, nest abandonment, emigration, and mortality of individuals, depending on the species. Salvage harvesting could result in localized minor direct impacts on wildlife from disturbance, loss of food or cover resources, and short-term disturbance of breeding, feeding, or sheltering. Harvesting activities under this alternative would also have the most impact on fish and aquatic resources because they would be allowed within 100 feet of springs and riparian habitat and therefore would result in increased impacts.

Individual Effects under Alternative C

Encroachment by pinyon pine and juniper stands would not be managed under Alternative C. Loss of sagebrush communities due to encroachment would be detrimental to species that depend on sagebrush habitat; however, juniper encroachment within the WDO is usually localized and therefore has limited impact. Alternative C would result in the least impacts on wildlife and aquatic resources from harvesting since it places the most restrictions on these activities.

Management of old growth forest would benefit species that use these areas, particularly migratory birds.

Individual Effects under Alternative D

Management of pinyon pine and juniper encroachment has the same effects as those described under Alternative B. Prioritizing various tree stands for fire suppression would have the same impacts as those under Alternative A. Management of old growth forest would have the same effects as those described under Alternative C.

Effects from harvesting are similar to those described under Alternative B; however, impacts from commercial harvesting are expected to be reduced since this activity would be allowed only on a case-by-case basis to achieve resource objective. Harvesting juniper and pinyon trees would be

prohibited within 100 feet of springs and riparian areas, unless trees are identified for selective removal to meet resource objectives, reducing the potential effect of these activities on aquatic resources in these areas.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Spread of noxious and invasive weeds decreases habitat quality, habitat diversity, and wildlife forage. Treatment actions would not be sufficient to control the spread of weeds into all wildlife habitats but would reduce these impacts in treated areas. Actions to prevent and control invasive and noxious weeds using integrated weed management techniques could reduce or at least slow the rate of increase in the WDO and severity of damage to wildlife habitats across all alternatives. Reducing the quantity of invasive species, thereby decreasing plant competition, would allow native species vital to wildlife to increase (or at least would slow down the rate of decrease). Although weed treatments would generally improve wildlife habitats in the long term, short-term disturbances to wildlife would occur. Weed treatment actions could remove forage and cover in areas dominated by weeds, resulting in short-term impacts on wildlife that are using weed infested areas. Short-term impacts would vary by type of application. Treatments, especially mechanical treatments, would cause some species to temporarily avoid treated areas. Some injury and death could occur from machinery, especially for small less mobile species.

Depending on existing riparian ecological condition and potential for weed infestations, large noxious weed infestations could provide inferior riparian habitat than populations of native riparian species could provide, which could affect aquatic habitats. Noxious weed control measures would help prevent these conditions. Invasive plants can create or exacerbate conditions that reduce water quality. Directly or indirectly, invasive plants can affect stream bank stability, sediment, turbidity, shade and stream temperature, dissolved oxygen, and pH (USFS 2005). Reduction of total acres impacted by invasive plants would positively affect water quality and therefore aquatic resources.

Individual Effects under Alternative A

Alternative A includes the use of chemical treatments and prescribed burning for weeds management. These measures may be more effective for weed management in some cases. Assuming chemical treatments would be applied with all applicable guidelines, effects at the population level are not expected. Prescribed fires are usually conducted during the spring or fall and are generally "cooler" than summer wildland fires. The short-term direct effect of these fires is the alteration of habitats and displacement of wildlife. Prescribed fires would improve the diversity of vegetation age classes and would lead to greater herbaceous vegetation production and forage quantity and quality, improving palatability for some wildlife species. Conversely, the loss of late successional vegetative communities would reduce habitats available to species requiring expansive tracts of contiguous late successional habitat. Although prescribed fire is a weeds management option under this alternative, present use of prescribed fire within the WDO is limited; it is used for controlling saltcedar in small localized applications.

Individual Effects under Alternative B

Effects are the same as those described under Alternative A.

Individual Effects under Alternative C

Under Alternative C, chemical treatments and prescribed fires would not be used for weeds management; therefore, effects resulting these treatments, as described in Alternative A, would not occur.

Individual Effects under Alternative D

Effects are the same as those described under Alternative A.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no identified effects common to all alternatives from chemical and biological control management.

Individual Effects under Alternative A

Under Alternative A, no pesticides or herbicides would be applied to streams, lakes, or reservoirs unless adverse impacts could be adequately mitigated. This would likely reduce impacts on fish and other aquatic wildlife that result from exposure to these substances, as well as wildlife that forage on these species and aquatic vegetation. However, lack of further specific management actions pertaining to the use of chemical treatments for pest control in these and other areas may result in direct impacts on wildlife through degradation of habitat. There are no management actions pertaining to biological control under this alternative.

Individual Effects under Alternative B

Assuming chemical treatments would be applied with all applicable guidelines, no population-level effects are expected. Inclusion of specific management actions pertaining to pesticide use would reduce potential adverse impacts on wildlife and habitat, as compared to Alternative A.

Impacts from the use of biological controls may occur if an introduced species preys on a species other than the one it was intended to control. An example is if the introduced species reduces the population of an organism that is a key food source for another species but that is not the target species. Assuming biological controls would be fully evaluated before they are used, potential adverse effects from their use would be reduced.

Individual Effects under Alternative C

Effects are similar to those described under Alternative B, except the use of biological treatments over chemical treatments would be emphasized, reducing impacts on wildlife and aquatic resources from pesticide use.

Individual Effects under Alternative D

Effects are the same as those described under Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Management to achieve land health standard would result in healthy ecological conditions, including quality habitats for wildlife. Actions, such as seedings and land treatments, designed to promote the health of native vegetation communities and to rehabilitate areas in nonnative vegetation would generally reduce degradations of wildlife habitat quality and improve it where rehabilitated by increasing quantity and quality of native plant communities that form habitats. Species that use sagebrush and grassland habitat would be the most affected and include sage-grouse, pronghorn antelope, and mule deer. Sagebrush habitats are probably the most important habitats within the WDO and measures put in place to maintain or improve these communities would benefit the host of wildlife species that use them. Special management of mountain browse species would result in diverse sagebrush and mountain shrub habitats and would provide forage for species such as mule deer. Land treatments facilitate maintaining habitats in various stages of shrub or understory condition, particularly sagebrush steppe. There would be short-term disturbances to wildlife, similar to those described in the preceding weeds management section. In addition, closing burned areas to livestock grazing would facilitate the recovery of vegetative communities in these areas.

Individual Effects under Alternative A

Effects from chemical treatments and prescribed burning are similar to those described under Alternative A, Effects from Vegetation—Weeds Management. Effects from biological treatments are similar to those described under Alternative B, Effects from Vegetation—Weeds Management. Restoring crested wheatgrass seedings could result in localized minor impacts on wildlife from disturbance and loss of food or cover. Areas within the WDO where crested wheatgrass restoration would occur are limited, so impacts on fish and wildlife would be limited and localized. Grazing can have both beneficial and detrimental impacts, as discussed under Effects from Livestock Grazing Management—Effects Common to All Alternatives. Site-specific, short-term prescriptive grazing could stimulate growth of some plant species and control weeds. When conducted properly with consideration for wildlife habitat objectives, prescriptions would probably be neutral to beneficial in their impact. Managing grazing activities in rangelands to achieve reduction of hot season grazing use of wetland and riparian areas would decrease impacts from habitat degradation in these areas.

Individual Effects under Alternative B

Effects are the same as those described under Alternative A. In addition, actions to maintain or improve salt desert scrub habitats would be beneficial to wildlife. Although not as crucial to wildlife as other habitats within the WDO, salt desert scrub habitats are important when considered on a landscape scale.

Individual Effects under Alternative C

Chemical treatments and prescribed fires would not be used for rangeland management; therefore, effects resulting these treatments, described under Alternative A Effects from Vegetation—Weeds Management, would not occur. Effects from management of salt desert scrub habitat are the same as those under Alternative B.

Alternative C includes grazing and no grazing options. Under Alternative C, Option 1, the effects from rangeland management are similar to those described in the Effects Common to All Alternatives section, with the addition of emphasis of using native seed stock in management, which would provide greater benefit to wildlife and habitat by establishing native communities over nonnative communities.

Eliminating grazing (Alternative C, Option 2) should result in improved ecological conditions in native habitats. As the ecological condition improves, the health, vigor, and abundance of forage species should increase. Pronghorn antelope use grasses and forbs and the probable increase in grass and forb availability would enhance habitat quality. Improvement of sagebrush steppe habitats should also occur, benefitting big game as well as other species.

Individual Effects under Alternative D

Effects are similar to those described under Alternative A, with the addition that restoration efforts would be focused on important wildlife habitats, thereby increasing potential benefits to wildlife. Effects from management of salt desert scrub habitat are the same as those under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Actions that would improve riparian and wetland PFC would in turn improve habitats for riparian- and wetland-dependent wildlife species, especially via increases in quantity and quality of riparian vegetation. In addition to their importance to fish and aquatic species, riparian areas are critical to wildlife in the WDO (WAPT 2006). Springs and associated meadows are also an important source of water to wildlife as well as a source of forage.

Individual Effects under Alternative A

Under Alternative A, riparian management actions would continue to reduce the potential for degradation of riparian wildlife habitat. Implementing BMPs addressing nongrazing impacts, such as water diversions, roads, and recreation, would avoid and mitigate many surface disturbances and erosion. This also would protect and enhance riparian vegetation, which could reduce impacts on riparian-dependent wildlife habitats from other resource uses, especially those associated with roads and those located in riparian areas.

Individual Effects under Alternative B

Alternative B would be more effective than Alternative A at improving riparian wetland areas because it establishes a specific quantitative goal to increase PFC from 48 percent to 60 percent by 2028.

Individual Effects under Alternative C

Alternative C would be the most effective at improving riparian wetland areas because it aims to increase PFC from 48 percent to 85 percent by 2028.

Under Alternative C, Option 1, impacts on riparian and wetland habitats from grazing, such as competition for water and forage and habitat alteration and loss, would be minimized, as compared

to the other alternatives, by establishing specific grazing management objectives that would reduce the impacts of grazing on riparian and wetland systems that affect wildlife use.

Alternative C, Option 2 would eliminate impacts from grazing to wetland and riparian areas, resulting in improved habitat for wildlife.

Individual Effects under Alternative D

Effects from improving riparian wetland areas are similar to but slightly less than those under Alternative C since Alternative D would not require achieving 85 percent PFC by 2028, as long as areas are progressing toward PFC.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Fish and wildlife resources would benefit from development of specific objectives and actions to protect and enhance habitat conditions. Restrictions on uses within sensitive or priority wildlife habitats would mitigate or eliminate impacts on wildlife resources.

Avoidance and mitigation measures to limit the impact of surface-disturbing and other disruptive activities during the breeding season of migratory birds would help maintain habitat suitable to the reproductive requirements of these species during crucial breeding periods.

Management actions to maintain and enhance waterfowl habitats would help to maintain habitats suitable to meet the life history and habitat requirements of these species.

The management of streams, banks, and shorelines to improve their PFC rating and limit stream bank alteration would improve habitat conditions for various fish and wildlife species.

Individual Effects under Alternative A

Reintroducing bighorn sheep could help reestablish a native species to the ecosystem, adding to the diversity of the WDO. Although management actions would attempt to resolve all conflicts with domestic sheep prior to reintroduction, risk of disease transmission that could be detrimental to bighorn sheep populations would still exist.

The establishment of pioneering elk would also add to the diversity of the WDO but may impact some species due to competition for habitat and forage.

When feasible, fencing to keep livestock from reservoirs on public land that supports fisheries would benefit fish and aquatic resources by removing a source of water degradation.

Individual Effects under Alternative B

Sagebrush-dependent wildlife would benefit by the designation of 716,528 acres of Priority 2 wildlife habitat areas for sage-grouse and sagebrush obligate species. Priority 2 wildlife habitat areas would be avoidance areas for certain activities and construction of facilities, such as power lines and communication sites. Priority 2 wildlife habitat areas would also be avoidance areas or closed to certain mineral activities, as discussed under Minerals—Leasable, Locatable, and Salable, Effects

from Fish and Wildlife Management, which would protect habitats and benefit fish and wildlife in these areas.

Supplementing the big game populations in the WDO would increase population levels for those species and would provide additional food resources for predators. Transplants of big game wildlife species would not likely result in competition with local wildlife species for food, water, and habitat cover because, although many game species have overlapping habitat ranges within the WDO, individual species occupy distinct habitat niches.

The effects from reintroducing bighorn sheep are the same as those described under Alternative A. Pioneering elk populations would not be permitted to become established under Alternative B, eliminating potential adverse impacts from their presence within the WDO.

Construction of wildlife water developments (guzzlers) could displace some local species, such as rodents and reptiles, depending on the level of surface disturbance required. Wildlife within the local area could be disturbed from breeding, feeding, and sheltering during construction; impacts would vary by guzzler capacity. However, new water developments benefit most game and nongame species in the area by allowing them to colonize new habitat areas that were previously too arid.

Reservoirs on public land that supports fisheries would not be fenced, in order to allow livestock access. Livestock use of these areas would contribute to water quality degradation, which could impact the health of fisheries.

Individual Effects under Alternative C

Designation of 1,279,481 acres as Priority 1 wildlife habitat areas and 869,645 acres as Priority 2 wildlife habitat areas would preserve habitat for sage-grouse and sagebrush obligate species. Priority 1 wildlife habitat areas would be exclusion zones for corridors, ROWs, and energy projects, protecting these valuable habitat areas. Priority 1 and Priority 2 wildlife habitat areas would also be avoidance areas or closed to certain mineral activities, as discussed under Minerals—Leasable, Locatable, and Salable, Effects from Fish and Wildlife Management, which would protect habitats and benefit fish and wildlife in these areas.

Effects from transplanting big game wildlife species are the same as those described under Alternative B. Effects from the establishing pioneering elk are the same as those described under Alternative A.

Under Alternative C, wildlife water developments would not be constructed, and existing wildlife water developments would be removed. This could lead to mortality of individuals and loss of the local population in areas where species have become dependent on these sources.

Under Alternative C, waterfowl habitats at Gridley Lake and Continental Lake would be further protected by the use of fencing to exclude livestock and burros and closure to OHVs.

Fencing all reservoirs on public land that support fisheries to keep out livestock would benefit fish and aquatic resources by removing a source of water degradation.

Fishery streams, spring brooks, and lentic fishery resources would have the greatest potential for improvement and benefit to fish and aquatic species by limiting annual stream bank alteration to 10

percent or less of linear bank length, as compared to 20 percent alteration under Alternatives B and D. In addition, alteration of areas with sensitive channel types would be limited to five percent under Alternative C, as compared to 20 percent under Alternative B and 10 percent under Alternative D. Numerical percentages pertaining to stream bank alteration limitations are not provided under Alternative A.

Individual Effects under Alternative D

Alternative D would be less effective at protecting sagebrush habitat resources than would Alternative C. The total overall acreage designated as Priority 1 and 2 wildlife habitat areas is 123,230 acres less under Alternative D, and the area designated as Priority 1 is 579,552 acres less than under Alternative C.

Effects from transplanting big game wildlife species are the same as those described under Alternative B. Effects from reintroducing bighorn sheep and establishing pioneering elk are the same as those described under Alternative A. Constructing wildlife water developments has effects similar to those described under Alternative B.

When feasible, fencing to keep livestock from reservoirs on public land that supports fisheries would benefit fish and aquatic resources by removing a source of water degradation.

Effects from Special Status Species Management

Effects Common to All Alternatives

Fish and wildlife resources would benefit from implementing use restrictions for special status species by reducing or eliminating disturbances that would otherwise have affected fish and wildlife resources.

Restrictions on certain surface-disturbing activities, such as vegetative treatments, in special status species habitats would reduce or eliminate potential adverse effects from the treatment to fish and wildlife species but would also prevent realization of benefits to the species from the action.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Wildlife, specifically big game species, and wild horses would compete for forage and habitat. Ensuring wild horses and burros have water sources may adversely impact fish and wildlife. Wild horses tend to dominate water sources, to alter habitats, and to drive away wildlife. Wild horse use of riparian and wetland areas would decrease the value of these areas for fish and wildlife by affecting habitat complexity and stability.

Individual Effects under Alternative A

Ensuring that proper herd objectives are maintained would help reduce the competition between wild horses and wildlife species and would improve the suitability of riparian and wetland habitats for various fish and wildlife species.

Individual Effects under Alternative B

Effects are the same as those described under Alternative A.

Individual Effects under Alternative C

Management actions pertaining to population control are limited under this alternative, and wild horse and burro populations may increase beyond appropriate management levels. An increase in these populations would increase competition with wildlife for water, forage, and habitat requirements. An increase in wild horse and burro populations would further exacerbate riparian and wetland habitat degradation, thereby reducing the suitability of these habitats for terrestrial wildlife and aquatic species.

Development of alternate water sources for wild horses and burros would also provide water resources for wildlife in areas where the natural supply is limited.

Individual Effects under Alternative D

Effects are the same as those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildland fire could be beneficial or detrimental to wildlife and their habitats. For example, fire acts as a rejuvenator by returning nutrients to the soil. Fire also reduces dense understory that has mixed values for various species of wildlife. In late-successional vegetation communities, fire would return the vegetative community to an earlier stage of succession. This conversion provides diversity in habitat, forage and cover, although species that prefer late-seral communities could be affected by the alteration of their habitat. However, adverse impacts on habitat can also occur from fire, as in the conversion of burned sagebrush habitat to cheatgrass and wild mustard, which results in a loss of forage and cover for sagebrush dependent species.

Fuel treatments can aid in limiting the size of wild fires, thereby reducing the extent of impacts from potentially catastrophic fires. Emergency Stabilization and Rehabilitation activities, such as erosion control measures and reseeding, performed following fires would facilitate restoration of degraded sagebrush and grassland habitat, benefiting species that use these areas.

The primary impacts of fire on fish and wildlife are the periodic conversion of habitats from large catastrophic fires or from aggressive fire suppression techniques, such as use of heavy equipment for fireline construction, that alter the natural density, structure, and composition of fire-adapted or fire-threatened habitats. Wildfires impact fish and wildlife resources by altering or reducing available habitat, reducing habitat suitability, changing the structure or composition of the habitat, and killing individuals. Direct impacts on fish and wildlife resources vary by species.

Depending on species mobility, wildlife would experience impacts from death or displacement, disturbance from fire suppression, and reduction of air quality from smoke and ash. While small mammals, reptiles, and amphibians are most at risk death because of their limited mobility, occasionally large mammals are killed by severe fast-moving wildfires, typically from smoke inhalation (Smith 2000).

Wildfires may also cause large-scale or intense alterations of habitat components for many fish and wildlife species, which would favor some species and would displace others. Immediate post-fire conditions raise light penetration and temperatures on and immediately above and below soil surfaces and can reduce soil moisture, affecting ground-dwelling species (Lyon et al. 1978).

Burning cover and destroying trees, shrubs, and forage modify habitat structure. The loss of small ground cover and charring of larger branches and logs would affect small animals and birds that use these components for nesting, thermal or escape cover, or foraging.

Alterations in terrestrial or riparian habitats would also affect water quality and habitat components for fish and other aquatic species. Wildfires may leave the surrounding soil and accumulated ash vulnerable to erosion and remove shading streamside vegetation, which would increase sedimentation and water temperature. Aquatic species could also be subjected to the direct impacts of increased sedimentation and water temperatures from removal of upland vegetation. The duration, intensity, and scope of these direct impacts depend on the species and the characteristics of the fire.

Fire suppression also has direct and indirect impacts on fish and wildlife species and their habitats. Water taken from small ponds for helicopter bucket drops may affect aquatic organisms by depleting their habitat, removing individuals, or spreading disease or nonnative predatory species among different water sources. However, it is sometimes possible to use water drops as an alternative to constructing hand lines, which are fire control lines where the surface is cut or cleared using hand tools, to control fire movement. Helicopter drops would result in less impact on soil and vegetation than hand line construction and, therefore, would have less impact on wildlife, both in intensity and duration.

Hand line construction would remove and disturb soil and vegetation, possibly affecting animals such as small mammals, invertebrates, and ground-nesting birds. The presence of hand line crews in remote locations could directly disturb some wildlife. Removal of live vegetation can also lead to soil erosion and increased siltation in adjacent lakes and streams. Direct and indirect impacts from most suppression techniques would be short-term, temporary, and localized, particularly if sensitive habitats are mitigated or avoided.

Individual Effects under Alternative A

Alternative A does not identify areas that would potentially benefit from allowing fire for resource benefit. By not prioritizing suitable areas for allowing fire for resource benefit, habitat improvement and restoration actions may not be implemented in the most effective areas.

Individual Effects under Alternative B

Designating 110,167 acres as suitable for allowing fire for resource benefit could benefit wildlife through long-term improvements in habitat. This is because lands most in need of fire treatments would be prioritized, allowing for more efficient and effective treatment application. Wildlife and their habitats could be disturbed in the short term, but their habitats would be improved in the long term. These areas represent a small portion of the total WDO, so impacts are likely to be localized. Of the 110,647 acres designated suitable to allow fire for resource benefit, 3,361 acres are designated as Priority 2 wildlife habitat areas under Alternative B. These lands are in the Granite Range

(Gerlach) and include habitat for mule deer and pronghorn antelope. Because this area is less than one percent of the 716,528 acres of designated Priority 2 wildlife habitat areas under Alternative B, impacts from allowing fire for resource benefit in priority wildlife habitat areas would likely be limited and localized.

Individual Effects under Alternative C

Allowing fire for resource benefit would not be practiced to achieve resource objectives under Alternative C, which could prevent certain lands from being treated effectively to improve habitat value.

Individual Effects under Alternative D

Establishment of priority wildlife habitat areas and important vegetation communities as priority fire suppression areas would have the same effects as those under Alternative C.

The effects from designating 9,932 acres as suitable for allowing fire for resource benefit to achieve resource objectives are similar to those under Alternative B. Of the 9,932 acres designated suitable for allowing fire for resource benefit, 5,619 acres are designated as Priority 2 wildlife habitat areas under Alternative D. None of the area designated as suitable for allowing fire for resource benefit is in Priority 1 wildlife habitat areas. Because this area is less than one percent of the 2,025,896 acres of the total designated priority wildlife habitat areas under Alternative D, impacts from allowing fire for resource benefit in priority wildlife habitat areas would likely be limited and localized.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Management actions for preserving cultural resources would provide various degrees of wildlife and fish protection through habitat preservation by restricting surface-disturbing and other disruptive activities. For example, maintaining healthy pinyon-juniper woodlands would benefit wildlife species that occupy these areas, particularly migratory birds. Authorized excavation of cultural sites and cultural inventories would have only local and short-term impacts on wildlife and their habitats. The short- and long-term impacts associated with these actions would not be detrimental to wildlife and their associated habitat, given the limited footprint of such actions on the landscape.

Preservation of cultural resources may limit or prohibit land treatments and habitat restoration projects that would benefit wildlife. Costs associated with cultural resource surveys may also preclude projects because they become too expensive.

Effects from Tribal Consultation

Effects Common to All Alternatives

Tribal consultation is not likely to impact fish and wildlife resources.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Management actions for paleontological resources would provide various degrees of wildlife and fish protection through habitat preservation that minimizes vegetation loss and erosion by restricting disruptive activities, including those that disturb the surface. Adverse impacts from paleontological management, such as surface-disturbing exploratory activities, are expected to be localized and limited to wildlife with very small home ranges, such as rodents and reptiles. The requirement for conducting paleontological resource surveys before disturbing the surface may cause some proposed habitat improvement to become cost prohibitive.

Effects from Visual Resources Management

Effects Common to All Alternatives

Habitat improvement projects that would benefit fish and wildlife may be limited or prohibited in Class I VRM designated areas. The permissible scope of habitat treatments or restoration projects also may be limited in Class II VRM designated areas.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

There are no effects common to all alternatives from cave and karst resource management.

Individual Effects under Alternative A

Impacts on fish and wildlife are not likely to occur under Alternative A.

Individual Effects under Alternative B

Impacts on bat habitat from public visitation would be minimized by implementing mitigation measures, such as seasonal closures and bat gates.

Individual Effects under Alternative C

Alternative C would provide the greatest protection to bat habitat out of all other alternatives by prohibiting surface-disturbing activities within 500 feet of natural caves. This would prohibit construction of public safety improvements required to allow people to visit caves and to maintain a natural cave setting.

Individual Effects under Alternative D

Effects are the same as those described under Alternative B.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Generally, impacts from livestock grazing include the following:

- Competition for forage, water, and space;

- Habitat alteration, including reducing available vegetative cover;
- Competition for grass and forbs for big game and avian species;
- Adverse impacts on bighorn sheep from domestic sheep and goat grazing because of potential for disease transmission;
- Degradations to stream banks from compression, sloughing, and removing vegetation, resulting in erosion;
- Changes in plant species composition from overuse; for example, declines in perennial bunch grasses and forbs can result in less desirable species dominating the habitat;
- Potential loss of shrubs in riparian areas, leading to a decrease in nesting riparian songbirds and bank stability and increases in water temperature;
- Appropriate levels of grazing, stimulating growth of some plant species and increasing succulence;
- Overgrazing, which diminishes range condition;
- Fences that create travel barriers, cause stress and energy loss, result in injury and death from entanglement, alter big game distribution, and create perches for predators;
- Fences for controlling livestock to reduce impacts on vegetation, streams, and thus wildlife;
- Water developments that expand the spatial and temporal range of where both big game and livestock can exist, creating more pressure on vegetation and competition with each other; and
- New water developments allow increased use of an area by wildlife by providing previously unavailable watering sites.

Impacts on wetland and riparian areas would be minimized by implementing hot season grazing restrictions. In addition, maintaining developed spring sources to restore or preserve the biological integrity of the spring system would benefit wildlife.

Individual Effects under Alternative A

Continuous, yearlong livestock grazing, even under utilization standards, is detrimental to ecological health because under these conditions perennial bunch grasses will begin to be eliminated from an area, removing a key forage source for several species; variations in timing and grazing are needed to maintain long-term healthy populations of key species. TNR use could be particularly detrimental by depleting wildlife habitats.

Use of adaptive management principles, which include wildlife habitat objectives, could help mitigate livestock grazing impacts on wildlife habitats. Availability of forage banks could provide additional forage for wildlife when these land areas are rested. Developing springs for livestock would expand and enhance wildlife habitat. Proper installation of these features would minimize impacts on wetland and riparian areas from their construction and would reduce long-term impacts on these areas by providing an alternate water source for livestock.

Individual Effects under Alternative B

Effects are similar to those described under Alternative A, except that impacts from forage banks would not occur because they would not be provided under Alternative B.

Individual Effects under Alternative C

Alternative C includes a grazing and a no grazing option. Under Alternative C, Option 1, potential effects from livestock grazing management are similar to those described in the Effects Common to All Alternatives section, except that no artificial waters would be developed under this option. Use of adaptive management principles, which include wildlife habitat objectives, could help mitigate livestock grazing impacts on wildlife habitats. Existing water developments would be required to provide water for wildlife from June 1 to September 30, regardless of whether livestock are present, which would provide additional water resources for wildlife during the dry season. Effects from provision of forage banks are the same as those described under Alternative A. TNR use would not be permitted under Alternative C, Option 1, and acquired lands would be closed to grazing, providing some additional protection of habitat. Detrimental impacts on fish and wildlife resources from grazing use management would be minimized under Alternative C, Option 1, due to numerous use restrictions that would minimize impacts on wildlife habitat.

Alternative C, Option 2 should result in improved ecological condition. This no grazing option would eliminate adverse impacts from grazing to wetland and riparian areas as well as upland habitats, resulting in improved habitat for wildlife. This option has the greatest potential to minimize impact from grazing and to facilitate healthy ecological conditions that would benefit terrestrial and aquatic species. Exceptions are areas that are already dominated by cheatgrass and areas where closure to livestock grazing releases existing cheatgrass populations.

Individual Effects under Alternative D

Of the grazing alternatives, Alternative D closes the most total acreage to grazing, approximately 21,000 acres more than under Alternative C, Option 1. Impacts from developing springs are the same as those described under Alternative A. Existing water developments would be required to provide water for wildlife from June 1 to September 30, regardless of whether livestock are present, which would provide additional water resources for wildlife during the dry season. Effects from providing forage banks are the same as those described under Alternative A. Effects from TNR use are less under Alternative D, as compared to Alternatives A and B, due to strict criteria for authorizing TNR grazing.

Effects from Minerals Management

Effects Common to All Alternatives

Minerals management impacts on wildlife generally occur from surface disturbance and thus loss and fragmentation of habitat, as well as disturbances from noise and movement from the exploration, construction, and operation of facilities and roads. Management actions listed in Chapter 2 spell out where, how much, and what type of mineral exploration and extraction can occur. In addition, the types of restrictions, such as those on siting and operation, that can be applied vary by the type of mineral activity and whether or not they are salable, leasable, or locatable resources. For example, the WDO has limited discretion over locatables. Differences between the

restrictions for each mineral resource are described in detail under the mineral resources environmental consequences (Section 4.3.2). Generally, the tighter the restriction, the fewer impacts on wildlife.

In instances where conservation measures are not successful, or the identified buffers are inadequate, the actions associated with mining could impact fish populations and aquatic habitats. The potential impacts on fish and aquatic habitats from mining include the following:

- *Increased sedimentation on fish-bearing streams.* Excess sediment generation can be the direct result of surface disturbances for mineral extraction, drilling, and facilities construction and also for road construction, maintenance, and use. Increased sedimentation in streams can affect fish populations in a variety of ways, including direct mortality, reduction in suitable spawning gravels, egg death, and individual fish displacement. Increased sedimentation resulting from mining could occur even if the mining activities are outside the buffer zones.
- *Introducing hazardous materials to fish-bearing rivers, streams, and lakes.* Hazardous materials from mining activities and from equipment use and maintenance could be released into fish-bearing water bodies. Associated with locatable minerals extraction are mine tailings, which can introduce heavy metals into aquatic ecosystems, impacting the health of fish and aquatic species and, consequently, other species due to biomagnification. Similarly, the extraction of fluid materials can result in oil or other fluid releases, which could degrade water quality. Examples of this are the releases associated with well-flow testing for geothermal power development. Spills can also occur from equipment that uses hazardous fluids, such as gasoline and oil. The impact on fish populations depends on the type of hazardous material released and the quantity of the release. If severe enough, deaths can occur and habitat can become unsuitable for aquatic life.
- *Altered stream flow regimes.* Water yield increase resulting from vegetation removal and alteration of natural drainage could result in scouring stream channel bottoms and decreasing fish habitat and food sources.
- *Changes in water temperatures.* Water temperature can increase in areas where streamside vegetation is removed, increasing the amount of sunlight reaching the water. The default buffers and management constraints would minimize the amount of mining that would occur in these sensitive areas. If mining were to occur in riparian areas, increased water temperatures could reduce suitable habitat for cold-water fish species. As water temperature increases, the amount of available dissolved oxygen for fish and aquatic invertebrates decreases.

Designation of areas as open to leasing but subject to terms and conditions of the standard lease form would limit the BLM's ability to assign major or moderate stipulations (such as NSO) in those areas. Consequently, there could be an increased impact on aquatic habitats in these areas. The standard lease stipulations include compliance with established acts, laws, and regulations governing BLM land management, which would protect special status fish species. Areas designated as open to leasing with NSO stipulations would provide some protection to aquatic habitats by limiting the amount of surface disturbance. Protection would be realized where NSO stipulations are applied to riparian areas and areas upslope of fish-bearing streams.

Impacts from salable minerals, typically gravel, tend to be small scale and localized. Impacts occur primarily from surface disturbance, but use restrictions and closures would minimize many impacts.

Impacts from fluid and solid leasables are also typically small scale and localized, but cumulative effects can occur where there are numerous oil and gas wells over the landscape. Impacts within the WDO would be minimized by use restrictions and closures.

Development of locatable mineral resources results in alteration of habitat from surface clearing performed for exploration purposes. Reclamation of disturbed areas using proper seed mix can help mitigate the alteration of habitats. Special stipulations would minimize impacts on wildlife habitats.

The reasonably foreseeable development scenario would continue to avoid sensitive habitats and could continue to fragment adjacent habitats and wildlife corridors. This could create reproductively isolated populations, which would lower genetic diversity in species with already low numbers. This would make species less fit and potentially more susceptible to disease and predation.

Individual Effects under Alternative A

Under Alternative A, the greatest amount of acreage would be open to leasable fluid and solid minerals activities and the fewest acres would be closed. Areas open to salable mineral materials disposal would be subject to stipulations only on a case-by-case basis, which would likely result in less wildlife resource protection. Alternative A maintains the greatest amount of acreage to locatable minerals, with only minimal closures (6,543 acres). Approximately 60 percent of the area open to locatable minerals would be subject to requirements for special handling and additional stipulations for wildlife resource protection. Alternative A would result in the greatest impacts from minerals management because it places the fewest restrictions on areas available for mineral development and the fewest restrictions on operations that could impact wildlife.

Individual Effects under Alternative B

Under Alternative B, fewer acres would be open to leasable fluid and solid minerals activities, and more acres would be closed than under Alternative A. Acreage open to salable mineral materials disposal would be similar to Alternative A, but most of the area would be subject to standard authorization terms, which would likely result in greater wildlife resource protection than under Alternative A. Impacts from salable minerals management would be the same as under Alternative A.

Individual Effects under Alternative C

Under Alternative C, the fewest acres would be maintained for locatable minerals and leasable fluid and solid minerals activities, and the greatest number of acres would be closed. Acreage open to salable mineral materials disposal would be less than under Alternatives A and B, and most of the area would be acres open solely to permitted government agencies. This would likely result in increased resource protection from proper management and resource consideration in pursuing mineral interests. Overall, Alternative C would result in the least amount of impacts on wildlife and aquatic resources from minerals management because it closes the most area to mineral development and places the most restrictions to protect wildlife resources in areas available for mineral development.

Individual Effects under Alternative D

Effects are similar to those described under Alternative B, except more acres would be closed to mineral development and more acres of the public lands open to leasing would be subject to NSO stipulations and seasonal closures to protect resources, including wildlife and special status wildlife. Alternative D would have the fewest acres open to salable mineral materials disposal. Standard authorization terms and seasonal closures would be applied in some areas and would reduce impacts on wildlife and their habitats.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Direct impacts from recreation management actions include loss or modification of habitat from constructing recreational facilities, including roads. Recreation management activities that result in increased human presence would have short-term localized impacts on wildlife and fish species. These activities include hiking, biking, camping, fishing, hunting, and sightseeing. Larger scale visitation, such as commercial, competitive, and group activities, could have greater impacts, but effects would be minimized through use restrictions and mitigation measures. Increased human-wildlife interaction could cause animals to alter behaviors, home ranges, and habitat use and to become physiologically stressed. Development of new water-based recreation sites would increase impacts on fish and aquatic habitats through increased visitor use.

In general, OHV management activities that result in increased human presence would have localized impacts on wildlife and fish species. Impacts would vary by frequency of motorized travel in a particular area and could include increased displacement of wildlife, increased stress during critical periods, and degraded habitats. OHV use can alter the seasonal use patterns of many wildlife species. The effects from OHV use on fish and wildlife within the WDO could be reduced by updating the Transportation Plan and giving consideration to wildlife habitat, including wetland and riparian habitat, when designating existing routes and establishing new routes.

Individual Effects under Alternative A

Under this alternative the BLM would continue to manage 37,259 acres as the Pine Forest SRMA. Managing lands as SRMAs could encourage additional use of these lands and thus increase the level of disturbances to wildlife; however, by designating SRMAs, visitation and consequential disruption of other wildlife areas may be reduced. Under SRMAs, management actions can reduce the impacts of recreational activities, and adverse impacts can be closely monitored and addressed.

OHV use would be the most detrimental under Alternative A. Most of the WDO (6,782,790 acres) would be open to OHV use with minimal limited (416,652) and closed (24,832) designated areas.

Individual Effects under Alternative B

Under Alternative B, 6,013,947 acres would be designated as ERMAs. The Pine Forest SRMA would be maintained, but its size would be increased by approximately 60,000 acres, and three RMZs would be established in this SRMA. In addition, three new SRMAs would be designated, identifying recreation as the principal use of these lands.

Managing lands as SRMAs rather than ERMAs could encourage additional use of these lands and thus increase the level of disturbances to wildlife.

The Nightingale and Granite Range SRMAs would target more undeveloped or backcountry uses and the level of effects on fish and wildlife could be slightly intensified in these areas due to concentrated recreational use. Motorized use within these SRMAs would be relatively low.

Impacts on wildlife would be greatest from the Winnemucca SRMA, primarily from noise disturbance and overall increased visitation. Motorized use would be greatest in this SRMA. Main recreation activities in the Winnemucca SRMA would include OHV use, motorcycle and ATV riding, mountain biking, and competitive and community-sponsored events. This SRMA would see the most visitor use because of its accessibility and range of tourism-based activities.

Under Alternative B, 1,460,200 acres would be open to OHV use, with 5,445,218 acres limited and 24,832 acres closed to OHV use. None of the area open to OHV use would be within Priority 2 wildlife habitat areas under Alternative B. Approximately 709,117 acres of the 716,528 acres of Priority 2 wildlife habitat areas under Alternative B would be designated as limited to OHV use, which is approximately 99 percent of the priority wildlife habitat areas designated under this alternative. Areas that would be closed to OHV use include 4,504 acres of Priority 2 wildlife habitat areas. Of the RMP alternatives, this alternative would allow the most OHV travel and therefore would have the most impact on wildlife resources from OHV use.

Individual Effects under Alternative C

Under Alternative C, 7,168,451 acres would be designated as ERMA, which is an increase of 1,154,504 acres over Alternatives B and D. The Pine Forest SRMA would be maintained and expanded as under Alternative B. Only one new SRMA, the Winnemucca SRMA, would be designated under Alternative C, and they would contain one less RMZ than under Alternative B. Alternative C places the most limitations on commercial, competitive, and group activities. OHV use would be the most restricted under this alternative, with 61,427 acres closed, 7,143,177 acres limited, and zero acres open to OHV use. Under this alternative, 1,228,804 acres of Priority 1 wildlife habitat areas and 866,835 acres of Priority 2 wildlife habitat areas would be designated as limited to OHV use, which is approximately 98 percent of the total designated priority wildlife habitat areas. Areas that would be closed permanently to OHV use include 39,135 acres of Priority 1 wildlife habitat area. In addition, 3,657 acres of Priority 1 wildlife habitat areas and 2,579 acres of Priority 2 wildlife habitat areas would be closed seasonally. Alternative C would have the fewest impacts on wildlife resources because it minimizes development of recreational facilities that would attract visitors and place the most limitations on OHV use, thereby minimizing impacts from recreational use.

Individual Effects under Alternative D

Effects are similar to those described under Alternative B, but Alternative D would be more effective at reducing impacts from OHV use by further restricting OHV permitted use areas, including use in important habitat areas. None of the area open to OHV use would be within Priority 1 wildlife habitat areas under Alternative D; however, 111 acres of Priority 2 wildlife habitat areas would be designated as open to OHV use, which is less than one percent of the 1,325,967 acres of the designated Priority 2 wildlife habitat areas under Alternative D. Under this alternative, 696,273 acres of Priority 1 wildlife habitat areas and 1,300,240 acres of Priority 2 wildlife habitat

areas would be designated as limited to OHV use, which is approximately 99 percent of the total designated priority wildlife habitat areas. Under Alternative D, 25,185 acres of Priority 2 wildlife habitat areas would be closed permanently, and 7,083 acres of Priority 2 wildlife habitat areas would be closed seasonally. No Priority 1 wildlife habitat areas would be closed to OHV use under this alternative.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Authorized renewable energy development could have impacts on wildlife by removing vegetation for construction activities. Human disturbances from construction and operation of facilities, such as noise, movement, and vibrations, would alter wildlife behavioral use patterns in the vicinity of the project. Impacts would vary by species, type of development, topography, and habitat type. Development of wind turbines would kill or injure bats, raptors, and other migratory birds that collide with them.

Individual Effects under Alternative A

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative B

Adverse effects from renewable energy developments, as described under Effects Common to All Alternatives, would be reduced by designating 716,528 acres as avoidance areas.

Individual Effects under Alternative C

Renewable energy would have the least impact on fish and wildlife under Alternative C due to the designation of 1,297,481 acres as exclusion zones and 869,645 acres as avoidance zones. No overhead transmission lines or ROWs for energy projects would be allowed in exclusion zones.

Individual Effects under Alternative D

Effects are similar to those described under Alternative C, but Alternative D would be less effective at protecting wildlife resources. The total overall acreage designated as avoidance and exclusion zones for the renewable energy project is 123,230 acres less under Alternative D, and the area designated as exclusion zones is 579,552 acres less than under Alternative C.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Roads and trails can fragment habitats, reduce wildlife security areas, increase road kill, and alter home range and migration corridors of wildlife. On a broad general scale, roads decrease habitat quality and impair populations. The magnitude of impacts varies by species, habitat types, size and traffic volume of roads, and seasonal use. Species that have large home ranges, follow distinct migration patterns, or are wary of humans are affected the most by roads. Roads and trails increase human-wildlife interactions. Vehicles can degrade wildlife habitats from surface disturbance and can displace and stress animals. Motorized vehicle use and associated human uses that impact critical

habitat niches for wildlife, such as den sites, nest sites, critical foraging areas, travel corridors, and security areas, are particularly vulnerable to wildlife disturbances and displacement. Flood and sediment damage from improperly maintained roads and trails can degrade surrounding habitats, especially aquatic habitats.

Individual Effects under Alternative A

Decommissioning roads that present problems to the environment would reduce wildlife and habitat impacts in select locations.

Individual Effects under Alternative B

Under Alternative B, roads that present problems to the environment would be decommissioned only if alternative access were provided. The same condition would apply to removing, rerouting, and rehabilitating roads that adversely affect wildlife and habitat. Creating alternative access could result in additional impacts on resources, but Alternative B would require that roads be constructed to avoid creating fragment resource tracts. Impacts would further be reduced by temporary road closures during the wet season that would minimize sediment and erosion impacts.

Individual Effects under Alternative C

Effects are similar to those described for Alternative B, but alternative access would not be a stipulation for decommissioning, removing, rerouting, or rehabilitating roads that are adversely impacting wildlife. Of all the alternatives, Alternative C provides the most assertive approach for minimizing and avoiding wildlife impacts from transportation management.

Individual Effects under Alternative D

Effects are similar to those described for Alternative C, but Alternative D would be less effective than Alternative C because it contains fewer specific actions for minimizing and avoiding wildlife impacts.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Impacts on fish and wildlife from lands and realty management could include habitat loss, degradation, and species displacement from linear features (e.g., power lines, roads, and pipelines) and other permitted facilities (e.g., wind turbines). These activities primarily affect big sagebrush and grass habitat types, which are common in the WDO, and also affect the diversity of species found in these habitat types. Small animals that have very small home ranges may also be affected by habitat fragmentation resulting from linear features. ROW-approved actions for power lines, communication sites, and wind turbines also include injury and death to bats, raptors, and other migratory birds as a result of collisions. Increased road density and human presence would act to increase stress levels of wildlife during sensitive periods, such as breeding, migration, and wintering.

Benefits to fish and wildlife resources could also occur from lands and realty management by acquiring sensitive habitat. Habitat fragmentation could be reduced via land acquisition and adjustment that reduces the checkerboard pattern of public lands ownership and increases the size of publicly owned blocks of land. Larger blocks of contiguous lands allow for consistent

management of wildlife habitats without unregulated private land activities interspersed. Degraded habitat on acquired lands could be improved.

Impacts from land disposal would be minimized since only lands with little resources value are candidates for disposal and additional NEPA evaluation would be required before disposal.

Individual Effects under Alternative A

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative B

Potential adverse effects from lands and realty management, as described under Effects Common to All Alternatives, would be reduced by designating 716,528 acres as avoidance areas in order to protect resources.

Individual Effects under Alternative C

Lands and realty management would have the least impact on fish and wildlife under Alternative C due to the designation of 1,279,481 acres as exclusion zones and 869,645 acres as avoidance zones. No corridors, ROWs, or energy projects would be allowed in exclusion zones.

Individual Effects under Alternative D

Effects are similar to those described under Alternative C, but Alternative D would be less effective at protecting wildlife resources. The total overall acreage designated as avoidance and exclusion zones is 123,230 acres less under Alternative D, and the area designated as exclusion zones is 579,552 acres less than under Alternative C.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

Generally special management areas such as ACECs and RNAs result in protection of wildlife from human activities and long-term improvement or at least maintenance of habitat quality because of numerous use restrictions. All alternatives would maintain the existing Osgood Mountain milkvetch ACEC, but Alternatives C and D would provide greater benefit to wildlife resources by also designating three new ACECs (Pine Forest, Stillwater, and Raised Bog) covering approximately 97,760 acres. In particular, the diversity of protected habitat in the Pine Forest ACEC would benefit a variety of species, including American pika, Humboldt yellow-pine chipmunk, northern goshawk, sage-grouse, mule deer, western jumping mouse, Brewer's sparrow, and an array of sagebrush-dependent species.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Impacts on fish and wildlife resources from developing backcountry byways may displace individuals and alter immediate environments. Wildlife could be disturbed by increased human presence during sensitive seasonal periods, such as breeding, nesting, and migration. Adverse impacts from backcountry byways are expected to be limited to relatively small areas.

Individual Effects under Alternative A

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative B

The potential for adverse effects on wildlife resources from backcountry byways management is greatest under Alternative B because it emphasizes economic development, which may occur at the expense of resource protection.

Individual Effects under Alternative C

The potential for adverse effects on wildlife resources from backcountry byways management is least under Alternative C because they emphasize resource protection in their management actions.

Individual Effects under Alternative D

Effects are the same as those under Effects Common to All Alternatives.

Effects from National Trails Management

Effects Common to All Alternatives

Management actions for preserving national trails would provide various degrees of wildlife and fish protection through habitat preservation by restricting surface-disturbing and other disruptive activities within the protected zone of the trail. However, preserving national trails may limit or prohibit land treatments and habitat restoration projects that would benefit wildlife.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no identified effects common to all alternatives from wild and scenic river management.

Individual Effects under Alternative A

Alternative A does not include wild and scenic rivers management measures.

Individual Effects under Alternative B

Alternative B does not include wild and scenic rivers management measures.

Individual Effects under Alternative C

Wild and scenic river management can restrict activities that would alter the tentative classification. This could indirectly conserve wildlife habitat, especially habitat for riparian species, in areas where actions would have been authorized without the classification. Alternative C would protect eligible river segments, in accordance with tentative suitability classifications, for the North Fork of the Little Humboldt River, Washburn Creek, and Crowley Creek. This would benefit fish and wildlife in these areas.

Individual Effects under Alternative D

Alternative D does not include wild and scenic rivers management measures.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Lands with Wilderness Characteristics

Actions to preserve wilderness characteristics on lands outside of WSAs would help to create more desirable wildlife habitat, but indirect adverse impacts may occur if habitat projects that would benefit other wildlife are restricted to maintain wilderness characteristics. Areas with wilderness characteristics are small, relative to the overall WDO, so impacts would be localized.

Wilderness Study Areas

The WDO does not have discretion regarding management of designated WSAs, since they must comply with the Interim Management Policy and Guidelines for Lands under Wilderness Review (IMP, BLM Manual Handbook H-8550-1) (BLM 1995). WSAs would provide relatively undisturbed wildlife habitat in areas within the WDO. However, WSAs would increase the difficulty of accomplishing habitat improvement treatments. This is because protections to WSAs would limit the extent or effectiveness of vegetation treatments, such as weed treatments, since any type of mechanized work would be limited on these lands. Such protections would also prevent disturbances to wildlife and their habitats but also would prevent certain lands from being treated effectively to improve habitat value. WSAs are defined and distinct within the WDO, so impacts would be localized.

Individual Effects under Alternative A

Managing lands outside of WSAs with wilderness characteristics for multiple uses could degrade fish and wildlife habitat by increased noise, trampling, disturbance, and soil compaction. Areas with wilderness characteristics are small, relative to the total area of land in the WDO, so impacts would be localized.

Individual Effects under Alternative B

Under Alternative B, the BLM would manage 222,074 acres containing wilderness characteristics to meet multiple use and sustained yield objectives. This would protect wildlife resources but could allow some impacts from allowing multiple uses.

Individual Effects under Alternative C

Under Alternative C, as under Alternative B, the BLM would manage 222,074 acres containing wilderness characteristics, but under Alternative C the management would emphasize protection of wilderness characteristics. Under Alternative C, the BLM would impose restrictions and stipulations, including closing mineral leasing and ROW exclusion zones, which would benefit wildlife resources.

Individual Effects under Alternative D

Under Alternative D, the BLM would also manage 222,074 acres containing wilderness characteristics. Under Alternative D, the BLM would manage key resource value through other resources and resource use designations. Depending on the designations implemented and the uses allowed, some impacts on wildlife resources could occur. However, most restrictions would protect wildlife resources in the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

Impacts on fish and wildlife resources from development of watchable wildlife viewing sites may displace individuals and alter immediate environments. Wildlife could be disturbed by increased human presence during sensitive seasonal periods, such as breeding, nesting, and migration. Adverse impacts from watchable wildlife viewing areas are expected to be limited to relatively small areas. By designating these areas, visitation and consequential disruption of other wildlife areas may be reduced.

Individual Effects under Alternative A

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative B

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative C

Under Alternative C, new routes through or near sensitive areas and attracting increased traffic to remote areas would be avoided, minimizing potential adverse effects of developing wildlife viewing sites, as compared to the other alternatives.

Individual Effects under Alternative D

Effects are the same as those under Effects Common to All Alternatives.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Generally, actions to remediate contaminated sites to safeguard human health would also affect wildlife habitats and populations, especially those that depend on riparian and wetland habitats. Reducing contaminants in the environment reduces the potential for animals to ingest them. It also reduces biomagnification because contaminants are concentrated as they pass up through the food chain. Closing abandoned mines could affect bats. However, if the mines are closed in a manner to allow access to bats, then these bat populations would be preserved.

Effects from Sustainable Development Management

Effects Common to All Alternatives

There are no identified effects common to all alternatives from sustainable development management.

Individual Effects under Alternative A

Impacts on fish and wildlife are not likely to occur under Alternative A.

Individual Effects under Alternative B

Under sustainable development management actions, impacts on fish and wildlife from new operations would be reduced because existing facilities would be reused in place of creating new disturbances.

Reuse of sites could have detrimental impacts on fish and wildlife, but the effects would vary depending on the type of reuse and management of the use. Provisions to protect natural resources, including important habitats, would minimize potential impacts from sustainable development.

Individual Effects under Alternative C

Effects are the same as those described under Alternative B.

Individual Effects under Alternative D

Effects are the same as those described under Alternative B.

Cumulative Effects

The following factors are occurring within the WDO and can result or may be resulting in declining diversity:

- Decreases in the mule deer population;
- Reduction in sagebrush and salt desert scrub habitats from fire and invasive plants;
- Loss and degradation of wetland, aquatic, and riparian habitats from grazing use; and
- Declines in fish and bird populations from the loss and degradation of riparian and aquatic habitats.

These trends are likely to continue unless habitats and migratory corridors are properly managed.

Further aquatic habitat has been lost from the increased presence of invasive plants, drought, water diverted from natural waterways, and increased recreational and commercial activities. Drought and wildfire will continue to contribute to the loss of aquatic resources, and impacts may become more severe in the future due to global warming. Management actions in the RMP aim to address, minimize, and in some cases mitigate for impacts from grazing and commercial and recreational activities. In addition, management actions to reduce hot season grazing in riparian areas and reduction or maintenance of appropriate management levels for wild horse and burro populations would reduce future impacts on wetland and riparian areas.

Most of the cumulative projects have affected or will affect wildlife. Increased population, increased development in the area, fire, increased recreational activities and OHV use, habitat encroachment, and mineral development have the potential for the greatest effects. These actions and their interactions result in the loss of and changes in terrestrial and aquatic habitats, resulting in degraded quality of these habitats and the populations they support. The above actions directly and indirectly result in changes in vegetation species composition and structure. On public lands, these changes in vegetation have the greatest effect on wildlife, as opposed to private lands where development results in the complete loss of habitats under the footprint of infrastructure.

In the foreseeable future, implementing the RMP would put numerous new mitigation, restoration, and conservation measures in place that would reduce the potential extent and severity of effects from other actions. Actions on BLM lands would have a noticeable effect at the local level, and because of the large area encompassed by the WDO, the Winnemucca RMP's contribution to cumulative effects on wildlife across northwest Nevada is considerable.

The same types of cumulative effects would occur under all alternatives. Generally, Alternative C would contribute the greatest potential for improving wildlife and aquatic habitat because of numerous management actions, mitigation measures, and restrictions designed to improve wildlife habitats.

4.2.10 Special Status Species

Summary

Impacts on special status fish, wildlife, and plant resources in the WDO include loss or alteration of native habitats, increased habitat fragmentation, changes in habitat and species composition, disruption of species behavior leading to reduced reproductive fitness, and direct mortality. Surface-disturbing actions that alter vegetation characteristics (e.g., structure, composition, or production) have the potential to affect habitat suitability for special status fish, wildlife, and plants, particularly where the disturbance removes or reduces cover or food resources. Even minor changes to vegetation communities have the potential to affect resident special status populations.

The direct and indirect impacts of management actions on fish, wildlife, and plant resources may vary widely, depending on a variety of factors such as the dynamics of the habitat (e.g., community type, size, shape, complexity, seral state, and condition); season, intensity, duration, frequency, and extent of the disturbance; rate and composition of vegetation recovery; change in vegetation structure; type of soils; topography and microsites; animal species present; and the mobility of fish or wildlife species (i.e., the ability to leave a site or recolonize a site after a disturbance).

Proposed management practices can mitigate many of the effects from these actions. Alternative C would best protect habitat to maintain biological diversity of wildlife, while Alternatives A and B allow for some compromise to special status species and their habitat conditions. Alternative D combines aspects of the other alternatives to provide a flexible approach to achieving other management objectives while protecting special status species and their habitat.

Methods of Analysis

Methods and Assumptions

Special status fish, wildlife, and plant health within the WDO is directly related to the overall ecosystem health, habitat abundance, habitat fragmentation, and wildlife security provided, and thus many resource management actions have an effect on special status fish, wildlife, and plants. Impact analysis on special status species included an assessment of whether each action would result in the possible destruction, degradation, or modification of habitat, as well as impacts that could improve wildlife, plant, and aquatic habitat. The evaluations are confined to the actions that have direct, immediate, and more important effects on the planning area, instead of identifying and evaluating all possible interactions and cause-effect relationships, even those that are minor. In addition, special status species and potential special status habitat distributions over the landscape are patchy and localized. This limits potential effects from many resources, such as paleontological and geological resources, which are also small in extent and localized in the WDO.

Some impacts are direct, while others are indirect and affect special status species through a change in another resource. Direct impacts on special status species are considered to include disruption, trampling, or removal of rooted vegetation, thereby reducing an area's potential habitat; direct mortality of individual special status species; and actions that unequivocally reduce total numbers of a special status species or reduce or cause the loss of total area, diversity, vigor, structure, or function of potential or occupied habitat.

Potential indirect impacts include loss of habitat suitable for colonization due to surface disturbance; introduction of noxious weeds by various mechanisms or conditions that enhance the spread of weeds; increased noise; and general loss of habitat due to surface occupancy or surface compaction. Indirect impacts include those that cannot be absolutely linked to one action, such as decreased plant vigor or health from reduced air or water quality.

A large proportion of actions under all alternatives are mitigation measures for other actions and protective measures, so that many of the individual actions could improve habitats or the health of populations, depending on the success of the action when completed. The degree of impact attributed to any one management action or series of actions is influenced by the watershed, time and degree of action, existing vegetation, and precipitation. Quantifying these impacts is difficult due to the lack of monitoring data for most species. In the absence of quantitative data, best professional judgment was used according to the following assumptions:

- Success of mitigation is dependent on specific protective measures, past results, and the assumption that proper implementation of such would take place;
- Implementation-level actions will be further assessed at an appropriate spatial and temporal scale and level of detail;
- Additional field inventories could be needed to support implementation-level decisions, which may be subject to further analysis under NEPA;
- BLM would continue to manage fish, wildlife, and plant habitats in coordination with the Nevada Department of Wildlife; and

- The health of fisheries within the WDO is directly related to the overall health and functional capabilities of riparian and wetland resources, which in turn are a reflection of watershed health. Any activities that affect the ecological condition of the watershed and its vegetative cover would directly or indirectly affect the aquatic environment. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. As riparian systems adjust in response to the removal of vegetation or changes in hydrologic conditions, the availability of habitats required to fulfill the life history requirements of fish populations might be affected.

Only impacts on federally listed, proposed, or candidate, state threatened or endangered, or BLM sensitive species are discussed in this section.

Effects from Air Quality Management

Effects Common to All Alternatives

Air quality management actions would have indirect, speculative effects and are not likely to directly impact special status species or their habitats within the WDO under any of the alternatives.

Effects from Geology Management

Effects Common to All Alternatives

Both special status species habitat and geological interest areas are limited in acreage within the WDO, and as such, are unlikely to overlap. As a result, geology management actions are unlikely to impact special status species or their potential habitats under any of the alternatives.

Effects from Soil Resources Management

Effects Common to All Alternatives

Implementing Land Health Standards and Guidelines would help to maintain soil processes and their components, including appropriate vegetation and soil stability in the long term. These are important to land health, which is directly related to habitat quality. In addition, seeding and maintaining adequate vegetative cover within the WDO would have implications for special status species, which rely on adequate cover as habitat for protection from predators and the elements. Vegetative cover would also prevent sedimentation in water courses, which would indirectly improve the health of special status fish populations. Implementing BMPs for soil-disturbing activities and applying reclamation measures to mitigate adverse impacts on soils and water add additional actions that could indirectly benefit plants, wildlife, and their habitats. The BMPs could prevent additional soil-disturbing activities that could indirectly encourage healthy vegetation communities, which are the foundation of special status species habitats. Reclamation measures directly restore special status species habitats that have already been impacted. Although there may be nonnative species in some seed mixes, some wildlife habitat would be provided, which is preferable to leaving a site to revegetate with invasive weeds.

Individual Effects under Alternative A

There are no soil compaction prevention measures under Alternative A. This would indirectly impact special status species habitat, as soil compaction prevents water infiltration and may therefore affect vegetative health and vigor. However, there would be no restrictions on habitat improvement treatments in the long term.

Individual Effects under Alternative B

Soil compaction prevention measures under Alternative B would seek to mitigate adverse effects without seasonal closures. As such, special status species habitats would be impacted year-round, even during times when soils would be most susceptible to compaction. However, habitat improvement treatments could also occur year-round and could disturb special status species in the short term. These treatments would restore suitable habitat for special status species in the long term.

Individual Effects under Alternative C

Soil compaction prevention measures are the most stringent under Alternative C, providing for seasonal use restrictions. This would indirectly benefit special status species habitat value by preventing compaction but would limit when habitat improvement treatment could occur. Impacts would be long term.

Individual Effects under Alternative D

Soil compaction prevention measures would implement seasonal use restrictions, which would occur on a case-by-case basis. Indirect impacts on special status species include improved health and vigor from decreased soil compaction and increased infiltration, which would improve habitat value in the long term.

Effects from Water Resources Management

Effects Common to All Alternatives

Effective watershed management, which minimizes erosion, maintains hydrologic flow, and indirectly maintains vegetative community health, would result in healthy and diverse plant communities, which in turn provide wildlife habitat, especially in riparian areas. Healthy watersheds improve fish habitat and promote healthy fish populations.

Acquiring water rights that provide water to wildlife and acquiring water rights associated with instream flows would indirectly benefit special status species because water is a crucial habitat component for all wildlife.

Developing water sources for other uses, while ensuring that water is available to wildlife, would be crucial to maintaining habitat for special status species.

Individual Effects under Alternative A

Under this alternative, priority watersheds would not be managed. However, impacts on water resources would be reduced by compliance with water quality regulations and implementation of

BMPs and land health standards. This would protect special status species habitat throughout the WDO, but would provide the fewest action- and location-specific protections of all alternatives.

Individual Effects under Alternative B

Protecting priority watersheds implies that vegetative conditions within these areas would be in good ecological condition since disturbance would be reduced. This would indirectly benefit special status species in the long term, as maintaining water quality is an important component of habitat quality. Under this alternative, multiple uses would be allowed, which also would allow for habitat improvement treatments within priority watersheds to restore suitable habitat for special status species in the long term. In the short term, these surface-disturbing treatments could directly disturb special status species. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Water importation and exportation projects could negatively affect the location, quantity, and quality of water resources. This would result in direct effects on special status species by limiting and degrading the water supply and would have indirect impacts from altering water resources that supply their habitat.

Individual Effects under Alternative C

Alternative C includes the most thorough and protective list of BMPs and reclamation measures and emphasizes the use of natural or organic materials. Alternative C also provides the most protection of plants, wildlife, and their habitats, compared with the other alternatives, by establishing priority watersheds as exclusion areas for incompatible discretionary actions and placing limitations on water projects to ensure water is available to wildlife and for maintaining habitat. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Individual Effects under Alternative D

Alternative D includes a thorough and protective list of BMPs and reclamation measures and would provide for more protection of plants, wildlife, and their habitats than would Alternatives A and B. Management actions pertaining to priority watersheds and water projects are less stringent than under Alternative C. Impacts would be localized and limited by the relatively small acreage of the priority watersheds.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

In all alternatives, forest products management actions could impact special status species that use forest and woodland areas, particularly migratory birds and pinyon-juniper obligates. Actions, including monitoring, establishing early warning systems for insect or disease outbreaks, prioritizing various tree stands for fire suppression, and stand treatments, could improve habitat conditions, including diversity in age classes and species composition, over the long term. Managing stand health and providing various age classes within a stand is very important to species, as woodlands within the WDO provide habitat diversity in a predominantly sagebrush landscape.

Some forest treatments, such as mechanical control measures, would directly disturb wildlife habitat in the short term but would foster a healthier ecosystem in the long term.

Potential direct impacts on fish and aquatic habitat associated with forest management include increased sedimentation from surface-disturbing activities and changes in water temperatures. Increased sedimentation in streams can affect fish populations through direct mortality, a reduction in suitable spawning gravels, death of eggs, and displacement of individual fish. Water temperature can increase where streamside vegetation is removed or altered flow regimes exist, increasing the amount of sunlight reaching the water or reducing summer base flow conditions. As water temperature increases, the amount of available dissolved oxygen for fish and aquatic invertebrates decreases.

Considering aspen, cottonwood, and mountain mahogany in implementation plans would reduce impacts on these species and the species that depend on them. Managing for these species would also benefit riparian areas, which would have beneficial impacts on special status species, including LCT. These effects would be long term.

The extent of woodland areas within the WDO is limited, comprising less than one percent of the total land area. As such, impacts on special status species from forest and woodland product management actions would be limited and localized.

Individual Effects under Alternative A

Actions using fire as a management tool would directly and efficiently achieve desirable special status species habitat in the long term. In the short term, fire would directly disturb special status species and their habitats. Fire also would reduce the fuel load in woodlands, preventing catastrophic fires that could kill special status species. Other treatments would facilitate this habitat enhancement, including fencing, mechanical control, and herbicides. Such actions would directly enhance woodland health and special status species habitat value in the long term and in localized areas.

Managing pinyon pine and juniper would improve habitat health for species that depend on these woodlands, particularly migratory birds. In addition, controlling and removing junipers that have encroached on sagebrush habitats in localized areas benefits special status sagebrush obligate species, such as sage-grouse, since juniper has a tendency to outcompete sagebrush and associated understory species. However, under Alternative A, pinyon and juniper woodlands would be managed for the greatest number of uses, which could indirectly disturb special status species or their habitats through noise, trampling, and soil compaction in the long term and in localized areas.

No old growth forest would be designated, but management under Alternative A would designate other stands, including pinyon juniper stands, as appropriate and manage those actively. This would indirectly help to achieve forest health goals and would create higher quality special status species habitat, particularly for migratory birds.

Individual Effects under Alternative B

Effects from fire management of vegetation are the same as those described under Alternative A. However, Alternative B calls for more aggressive stand treatments, including fencing, mechanical, biological, or chemical treatments, and planting and seeding. The variety and breadth of treatment

types would provide a more flexible, adaptable approach to stand management. These could directly disturb special status species in the short term, but Alternative B has a high likelihood to efficiently restore special status species habitat in the long term and in localized areas.

Pinyon and juniper woodlands would be managed for fewer uses than Alternative A, with an emphasis on sustainable yield. Harvesting would be more intensive under Alternative B, with the potential for overharvest to reduce plant vigor and habitat value.

Old growth would not be designated under Alternative B, and none would be designated in the future. Adverse impacts on stands with old growth characteristics would be avoided, but these areas would not be managed to provide old growth characteristics in the future. This would impact the potential for these areas to provide suitable habitat for special status species. Impacts would be localized and long-term.

Individual Effects under Alternative C

Under Alternative C, fire would not be used to manage stands, which could prove less effective in achieving special status species habitat goals in the long term. However, it also would not disturb special status species or their habitat in the short term. In addition, fuel load accumulation could present a fire danger and increase the chance for a catastrophic fire event, resulting in direct effects on special status species and their habitat. Fewer treatments would be allowed within forests and woodlands, with only mechanical and biological treatments allowed. These, too, may be less effective in directly achieving habitat objectives. Impacts would be localized.

Pinyon and juniper stands would be managed only for landscape value and Native American uses. With less harvesting allowed in pinyon and juniper stands, there would be less human disturbance to special status species or their habitat. Impacts would be localized and long term.

Alternative C would designate 27,605 acres of old growth forest and other stands as appropriate. This would preserve and maintain these forests and their special status species habitat value. However, Alternative C would not actively manage stands for old growth characteristics, which may be less effective in improving habitat value for special status species. Impacts would be localized and long term.

Individual Effects under Alternative D

Actions under this alternative would use fire as a management tool, similar to Alternatives A and B. However, fire management would be more adaptive because it would prioritize stands for management. This would improve special status species habitat more effectively. Fire management also would reduce fuel loads as in Alternatives A and B. Other treatments, and the impacts associated with them, are the same as those described under Alternative B.

As in Alternative A, Alternative D would manage for the greatest number of uses and emphasizes multiple use. Impacts are similar to those described under Alternative A.

This alternative would designate 27,605 acres of old growth forest and would designate other stands as appropriate in the future. In addition, old growth stands would be actively managed to facilitate old growth characteristics. As a result, special status species habitat improvement goals would be most likely to be efficiently achieved in Alternative D.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Noxious and invasive weeds tend to homogenize plant communities. As a result, generalist species often are favored, but species with narrower niches suffer reduced populations or do not persist. Treatment actions would not be sufficient to control the spread of weeds into all special status species habitats but would reduce these impacts in treated areas. Although weed treatments would generally directly improve special status species habitats in the long term, short-term disturbances to wildlife would occur. Weed treatment actions could remove forage and cover in areas dominated by weeds, resulting in short-term impacts on special status wildlife that are using weed infested areas. Short-term impacts would vary by type of application. Treatments, especially mechanical treatments, would cause some species to temporarily avoid treated areas.

Invasive and noxious weeds can also create or exacerbate conditions that reduce water quality. Directly or indirectly, weeds can affect stream bank stability, sedimentation, turbidity, shade and stream temperature, dissolved oxygen, and pH (USFS 2005). Reduction of total acres impacted by weeds would positively affect water quality and therefore special status wildlife, particularly fish and birds.

Individual Effects under Alternative A

Using a variety of control methods, including chemical treatments and prescribed fire, would be the most direct, effective, and adaptable approach in controlling the introduction and spread of noxious weeds into special status species habitats. However, lack of education programs, implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, or new techniques could limit the effectiveness of weed management actions in the long term.

Individual Effects under Alternative B

Impacts from weeds management actions are similar to those described under Alternative A. However, education programs, implementation plans, SOPs (Appendix B), BMPs (Appendix B), mitigation measures, and new techniques could improve the effectiveness of weed management actions in the long term.

Individual Effects under Alternative C

Mechanical, cultural, and biological weed treatments would be used under Alternative C, which would help to improve special status species habitat in the long term. However, chemical control and prescribed fire would not be used under Alternative C. This would limit the effectiveness of control efforts throughout the WDO.

Individual Effects under Alternative D

Impacts from weeds management actions are the same as those described under Alternative B.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Using chemical control methods would help control and reduce weed outbreaks. The effects are similar to those described under weeds management.

Individual Effects under Alternative A

Restricting herbicide use near water sources would limit the effectiveness of pest treatments in riparian areas. This is especially restrictive, as current noxious weed outbreaks often occur near water sources and are treated with chemicals. This could lower habitat value for special status species, but it also would prevent impacts on nontarget species, particularly LCT and species that prey on LCT.

Approved biological controls are specific to target species, so there would be no impact on nontarget species. Chemical treatments would be applied according to label directions and following established guidelines, BMPs (Appendix B), and SOPs (Appendix B) for application. Chemical applications would also be designed to avoid effects to nontarget species.

Individual Effects under Alternative B

Using IPM techniques, BMPs, and cooperation and coordination with other groups and agencies would help reduce pests within the WDO. This would improve habitat health and value for special status species over the short and long term.

Using chemical and biological control methods would have similar impacts as those described for weeds management actions under Alternative A.

Individual Effects under Alternative C

Using IPM techniques, BMPs, and cooperation and coordination with other groups and agencies would help reduce pests. This would improve special status species habitat value over the short and long term.

Biological control methods could have impacts similar to those described under Alternative A. Restricting chemical control methods could limit the effectiveness of pest control in certain cases. This would slow, but is not likely to completely prevent, improvement of special status species habitat in the long term.

Individual Effects under Alternative D

Impacts from using chemical and biological control methods are the same as those described under Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

All of the alternatives have some actions that would provide for healthier rangeland habitats throughout the WDO. SOPs (Appendix B), BMPs (Appendix B), and mitigation measures would be used to reduce adverse impacts on rangelands.

Actions designed to promote the health of native vegetation communities and to rehabilitate areas with weedy and nonnative vegetation would generally directly improve special status species habitat quality by increasing quantity and quality of native perennials in the long term. Species that use sagebrush and grassland habitat, such as sage-grouse, would be the most affected. Sagebrush habitats are considered to be the most important habitats within the WDO, and measures to maintain or improve these communities would benefit the host of special status species that use them. There would be short-term disturbances to wildlife, similar to those described in the preceding weeds management section.

Individual Effects under Alternative A

If applied correctly, prescriptive grazing would reduce annuals and restore decadent plant vigor on localized rangelands. This would allow native vegetative cover to increase, which would reduce the likelihood of a catastrophic fire. Although fires will still occur, this action would minimize direct mortality to special status species and large-scale destruction of their habitats.

A variety of rangeland treatments would be implemented to achieve healthy rangeland conditions throughout the WDO. This variety would provide flexibility in BLM's approach to rangeland restoration and likely would provide the most effective means of achieving rangeland health goals. This would provide suitable habitat for rangeland-dependent special status species. However, these treatments would focus on sagebrush and would not be implemented in salt desert scrub communities. Further, fragmentation of sagebrush would not be given a high priority in rangeland management. This would limit the connectivity of habitats for special status species, potentially separating and preventing populations from reproducing.

Restoring crested wheatgrass seedings could result in localized minor impacts on special status species from disturbance and loss of food or cover. Areas within the WDO where crested wheatgrass restoration would occur are limited, so impacts on special status species would be limited and localized.

Compared with the other alternatives, there would not be reduction of CC on 70,000 acres under Alternative A. The benefits of CC reduction would not be realized as in the other alternatives, resulting in maintenance of fuel loads, which could lead to catastrophic fires. This could kill special status species or destroy their habitats.

Individual Effects under Alternative B

Prescriptive grazing would have impacts similar to those described under Alternative A.

A variety of rangeland treatments would be implemented to achieve healthy rangeland conditions throughout the WDO and would have impacts similar to those described under Alternative A. These treatments would focus on both sagebrush and salt desert scrub communities, which would impact a larger area of suitable special status species habitat. In addition, fragmentation of sagebrush would be avoided, and SOPs (Appendix B), BMPs (Appendix B), and mitigation measures would be employed to minimize impacts on sagebrush communities. This would reduce impacts on special status species that rely on sagebrush communities for habitat.

Restoring crested wheatgrass seedings would have impacts similar to those under Alternative A.

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would protect native vegetation from catastrophic fire. This would prevent weed invasion and promote healthy, productive, native vegetation in this area in the long term. As a result, special status species would be protected from direct mortality, and habitat would be protected from destruction.

Individual Effects under Alternative C

Option 1

Prescriptive grazing would have impacts similar to those described under Alternative A.

Fewer rangeland treatments would be implemented to restore rangelands throughout the WDO. This would limit the effectiveness of rangeland restoration, as additional treatments could provide more flexibility towards achieving this goal. As a result, special status species habitat value may not be as high on these lands. Rangeland treatments would focus on both sagebrush and salt desert scrub communities, which would impact a larger portion of the WDO and could impact a larger number of special status species. In addition, fragmentation of sagebrush would be avoided, and SOPs (Appendix B), BMPs (Appendix B), and mitigation measures would be employed to minimize impacts on sagebrush communities.

Restoring CC to Class II levels on 70,000 acres would have similar impacts on those described under Alternative B.

Option 2

Eliminating livestock grazing should improve ecological conditions and increase the health, vigor, and abundance of forage species. The probable increase in grass and forb availability would enhance habitat quality for special status species that rely on sagebrush habitats.

Prescriptive grazing would not be used under this option; as such, livestock grazing would not be available as a tool for vegetation treatments, and other treatments would have to be implemented. If these other treatments were to not achieve the treatment objectives, then the treatment may have to be foregone. Indirectly, rangeland health may be lowered, weeds could invade, and healthy special status species habitat might not be achieved in these areas.

The least aggressive rangeland treatments would be implemented to restore rangelands throughout the WDO. This would limit the effectiveness of rangeland habitat restoration, as additional treatments could provide more flexibility towards achieving this goal. Impacts on sagebrush and salt desert scrub communities would be similar to those under Alternative C, Option 1.

Restoring CC to Class II levels on 70,000 acres would have similar impacts on those described under Alternative B.

Individual Effects under Alternative D

Prescriptive grazing would have impacts similar to those described under Alternative A.

A variety of rangeland treatments would be implemented to achieve healthy rangeland conditions throughout the WDO and would have impacts similar to those described under Alternative A.

Impacts on sagebrush and salt desert scrub communities would be similar to those described under Alternative B.

Restoring crested wheatgrass seedings would have impacts similar to those under Alternative A.

Restoring CC to Class II levels on 70,000 acres would reduce fuel loads on these lands and would protect native vegetation from catastrophic fire. Impacts would be similar to those described under Alternative B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Actions that would improve riparian and wetland condition would directly improve habitats for riparian- and wetland-dependent special status species by increasing quantity and quality of riparian vegetation and by providing structure and cover for species. Affected species include numerous migratory bird species, LCT, and other riparian- and wetland-dependent wildlife. Meadows are particularly important to sage-grouse as brooding areas, so improvements to springs and associated meadows would benefit this species.

The extent of riparian and wetland areas within the WDO is limited, comprising less than one percent of the total land area. However, these areas are important for special status species, including migratory birds and LCT. In addition to their importance to fish and aquatic species, riparian areas are crucial to wildlife in the WDO (WAPT 2006). As such, impacts on special status species from riparian and wetland management actions would be localized but considerable.

Individual Effects under Alternative A

Restoring PFC would improve the health and diversity of aspen, cottonwood, willow, alder, and chokecherry stands in riparian areas throughout the WDO, which would create suitable habitat for special status species. Alternative A does not quantify the amount of PFC to be achieved, so impacts would vary depending on how much of these communities are restored.

Individual Effects under Alternative B

Restoring PFC to 60 percent by 2028 under this alternative would improve aspen, cottonwood, willow, alder, and chokecherry stands in riparian areas, providing for healthier stands and special status species habitat in the long term.

Individual Effects under Alternative C

The greatest amount of riparian areas and wetlands would be restored to PFC under Alternative C (a minimum of 85 percent by 2028). As a result, improvement of special status species habitat would be greatest in the long term.

Option 1

Adjustment of livestock grazing systems, season and duration or use, and adjustment of AMLs or permitted AUMs would be used in this option to minimize impacts on riparian areas and wetlands. Habitat value for special status species would be indirectly improved through less soil compaction

and weed spread or introduction. Direct effects include trampling of vegetation. Effects would be long term.

Option 2

Removing grazing from lands in the WDO would have the greatest benefit on riparian areas and wetlands, as there would be no impacts from soil compaction, weed spread and introduction, and trampling of vegetation by livestock. This would cause the greatest improvement in special status species habitat in the long term.

Individual Effects under Alternative D

Similar to Alternative C, the greatest amount of riparian areas and wetlands (85 percent) would be progressing toward or attaining PFC by 2028. Impacts are similar to but slightly less than those under Alternative C since Alternative D would not require achieving PFC by 2028, as long as areas are progressing toward PFC.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Modifying actions to avoid impacts on species or their habitat would protect these species from disturbance in the short term. Mitigation measures would be developed to implement land management treatments that would occur on these lands. This would help achieve suitable habitat conditions for special status species.

Maintaining and improving lentic and lotic habitats would improve habitat for some special status species in the long term because these areas are a source of water and provide forage for species. Certain treatments could directly disturb special status species, such as sage-grouse, in the short term.

Implementing HMPs that specify vegetation treatments to improve habitat involves altering species composition and vegetation structure. This could directly disturb special status species in the short term but would improve habitat value over the long term. Mitigation measures would be required for actions near nesting migratory birds, which would allow for habitat improvement treatments and would protect migratory bird species in the long term.

Individual Effects under Alternative A

Under this alternative, actions would not prioritize habitats for protection and would not emphasize coordination with NDOW. Lack of such protections could make it more likely that habitat value for these species would not be improved in the long term.

Reintroducing bighorn sheep could help reestablish this historically present species in the ecosystem, adding to the diversity of the WDO. Although management actions would be used to resolve all conflicts with domestic sheep before bighorn sheep are reintroduced, the risk of disease transmission that could be detrimental to bighorn sheep populations would still exist.

Establishing pioneering elk could impact some species by increasing competition for habitat and forage.

Restricting stream bank alterations would protect aquatic, as well as riparian- and wetland-dependent special status species, particularly LCT. Alteration percentages are not specified under Alternative A, so impacts would vary depending on how these restrictions are defined in implementation plans.

Individual Effects under Alternative B

Under this alternative, no acres of priority 1 habitat and 716,528 acres of priority 2 habitat would be designated. This would prevent disturbance to species and conversion of habitat, providing indirect protection to special status species within these areas. This would especially benefit sagebrush obligate species, as sagebrush composes most of the habitat within the priority habitat areas.

The effects from reintroducing bighorn sheep are the same as those described under Alternative A. Establishment of pioneering elk populations would be avoided under Alternative B, which would minimize potential impacts resulting from their presence within the WDO.

Constructing artificial water sources would benefit special status species by providing water where habitat was previously unsuitable. These artificial water sources would exclude wild horses and livestock, which would minimize impacts on habitat from these species. The effects would be long term.

Restrictions on stream bank alterations would protect aquatic, as well as riparian- and wetland-dependent special status species, particularly LCT. Impacts would be limited to 20 percent of the linear bank length.

Individual Effects under Alternative C

Under this alternative, 1,279,481 acres of priority 1 and 869,645 acres of priority 2 habitat would be designated. These designations would provide the greatest protection to special status species and their habitats in the long term. Designation of priority habitats would be especially beneficial to sagebrush-obligates, including sage-grouse, as sagebrush composes most of the habitat within the priority habitat areas.

Reintroducing and transplanting big game species could impact special status species in ways that are similar to Alternative B. The effects from establishing pioneering elk are similar to those described under Alternative A.

The greatest amount of restrictions on stream bank alterations would be implemented and would protect aquatic and riparian- and wetland-dependent special status species, particularly LCT. Impacts would be limited to ten percent of the linear bank length on streams, and five percent of the linear bank length on streams with sensitive channel types.

Individual Effects under Alternative D

Under this alternative, 699,929 acres of priority 1 and 1,325,967 acres of priority 2 habitat would be designated. These designations would prevent disturbance to special status species and their habitat in the long term, similar to impacts described under Alternative B.

Effects on special status species and their habitats from transplanting big game wildlife, reintroducing bighorn sheep, and establishing pioneering elk are similar to those described under Alternative A.

Restrictions on stream bank alterations would protect aquatic and riparian- and wetland-dependent special status species, particularly LCT. Impacts would be limited to 20 percent of the linear bank length on streams and 10 percent of the linear bank length on streams with sensitive channel types.

Effects from Special Status Species Management

Effects Common to All Alternatives

Special status fish, wildlife, and plant management actions would protect and work toward recovering listed species and would prevent listing species. Actions common to all alternatives that would protect special status species include the following:

- Activities that lead to listing species would not be authorized;
- Special status plant and pygmy rabbit inventories would be required for all actions in potential habitats;
- Any actions would require mitigation and monitoring for special status plants and suitable nearby habitat;
- Site-specific habitat plans would be implemented for sage-grouse by local planning groups;
- Cave habitats would be protected;
- Impacts on raptors, including bald eagle, golden eagle, prairie falcon, peregrine falcon, ferruginous hawk, and northern goshawk, would be mitigated;
- Special status species habitats would be improved;
- Recovery and management plans would be implemented, recovery and conservation teams would be formed, and USFWS conservation recommendations would be implemented; and
- The Osgood Mountains ACEC would be maintained to protect the Osgood Mountains milkvetch, and a mineral withdrawal would be pursued for these lands. The Osgood Mountains milkvetch population would be protected with these actions.

Individual Effects under Alternative A

Special status plant inventories would be required if actions were proposed on a site within a two-mile radius of known occurrences and if the site were to exhibit similar habitat characteristics of the sensitive plant. This would provide the greatest protection for sensitive plant species.

High profile structures would be permitted 0.25-mile to 2-miles from active leks on a case-by-case basis, which could impact sage-grouse from noise and habitat disturbance. Further, sage-grouse predators use high-profile structures for perching and could have direct effects by reducing populations or driving sage-grouse out of occupied habitats.

Surface disturbance would be prohibited seasonally within two miles of active sage-grouse leks. Exceptions, modifications, and waivers would be permitted in certain circumstances. Conservation

guidelines provided in the WAFWA and the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California would be used as guidance but would not be mandatory standards. This would reduce impacts on the species, but impacts could still occur on a case-by-case basis from noise and habitat disturbance.

Mitigation and monitoring would be required for any activities that would disturb pygmy rabbit habitat. This would reduce, but not eliminate, impacts on this species.

Restrictions and limitations to activities within 200 yards of suitable or occupied bat habitat would protect species from noise and habitat disturbance in the long term.

Transplanting LCT into suitable habitat would directly promote recovery of the species.

Individual Effects under Alternative B

Special status plant inventories would be required for actions near known occurrences. This would provide some protection for sensitive plant species, although the area to be surveyed is not defined, which could allow for some direct and indirect impacts on species from habitat removal, trampling, dust, and weed invasion.

Surface-disturbing activities would be prohibited near occupied sage-grouse leks unless mitigation measures would be sufficient to prevent impacts on the species. Mitigation measures would be required for high-profile structures near active sage-grouse leks, but the area of potential impact is not specified under Alternative B. These actions would reduce, but would not eliminate, impacts on sage-grouse.

Impacts from restrictions on surface-disturbing activities to active sage-grouse leks are the same as described for Alternative A.

Impacts on pygmy rabbits are the same as those described under Alternative A.

Bat inventory requirements are the same as those described under Alternative A.

Mitigation measures would be required for large-scale, surface-disturbing discretionary activities near occupied bat habitat. This would reduce, but not eliminate, impacts on sensitive bat species.

Mining near occupied bat habitat would be discouraged, and impacts would be similar to those described under Alternative A.

Prescriptive grazing would be permitted within livestock exclosures with wet meadows and riparian areas, which could impact special status species that use these habitats. When applied correctly, it could indirectly foster healthier habitat, with more native species and fewer invasive and noxious weeds. However, it also could directly impact special status species, such as LCT, through sedimentation, stream bank trampling, vegetation removal, and habitat loss.

LCT habitat would be managed to facilitate recovery of the species. This would indirectly help the species but would not directly increase the species' numbers.

Individual Effects under Alternative C

Protections to special status species would be greatest under Alternative C, as habitat- and species-disturbing activities would be the most restricted or prohibited.

Special status plant inventory requirements and impacts are the same as those described under Alternative A.

Surface-disturbing activities would be seasonally prohibited within two miles of occupied sage-grouse habitats. Surface-disturbing activities would be completely prohibited within known nesting, summer, or winter habitats. Exceptions and modifications would not be permitted, but some requirements may be waived on a case-by-case basis. Conservation guidelines provided in the WAFWA and the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California would be mandatory standards. In addition, high-profile structures would be prohibited within two miles of active leks. Combined, these actions would provide the greatest direct and indirect protections to sage-grouse from habitat and noise disturbance and from predators.

No disturbance would be permitted to active pygmy rabbit burrows. This would provide the greatest protection from disturbance of the species.

Protections for special status bats would be greatest under Alternative C and would prevent habitat disturbance and disturbance to individuals within 500 yards of potential and occupied habitat.

Actions and impacts on LCT would be similar to those described under Alternative B.

Prescriptive grazing within exclosures with wet meadows or riparian areas would not be permitted, which would prevent impacts on special status species.

Individual Effects under Alternative D

Special status plant inventory requirements and impacts are the same as those described under Alternative A.

Prohibitions near occupied sage-grouse leks would be similar to those described under Alternative C. However, exceptions, modifications, and waivers would be permitted on a case-by-case basis, and the conservation guidelines provided in the WAFWA and the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California would be used as guidance but would not be mandatory. This could cause some impacts from habitat and noise disturbance.

Restrictions on, and impacts from, activities near active leks and high-profile structures are similar to Alternative A.

Mitigation and monitoring for pygmy rabbits are the same as described for Alternative A.

Impacts from restrictions and limitations on disturbance to special status bat species and their habitat are the same as those described under Alternative A.

Impacts from prescriptive grazing within exclosures with wet meadows or riparian areas are the same as those described under Alternative B.

Impacts from LCT transplant are the same as those described under Alternative A.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Ensuring that wild horses and burros have access to water sources may directly and indirectly adversely impact special status fish, wildlife, and plants. Wild horses tend to dominate water sources, alter their habitats, and drive away wildlife. Wild horse use of riparian and wetland areas would decrease the value of these areas for special status fish, wildlife, and plants by affecting habitat complexity and stability. As a result, habitat value could be impacted through direct destruction of vegetation or reduced vegetative vigor.

Individual Effects under Alternative A

Maintaining established AMLs as a population range, using gathers when AML is exceeded, and using fertility control inhibitors would reduce the direct and indirect impacts of WHB on special status species habitat by decreasing the risk of soil compaction, trampling, and weed spread or introduction. In addition, use of perennial bunch grasses would be reduced. However, developing alternate water sources for WHB could increase impacts of WHB on special status species habitat by increasing the risk of soil compaction, trampling, and weed spread or by introducing weeds in areas that may not have been impacted by WHB in the past. Further, it could increase direct competition for water between WHB and special status species by concentrating WHB in areas where they may not have gathered in the past.

WHB protections, such as limiting proposed motor vehicle racing, would protect special status species from surface-disturbing activities and direct noise disturbance and would prevent direct and indirect habitat impacts due to human use, such as trampling and soil compaction.

Individual Effects under Alternative B

Impacts from population control measures are similar to those described under Alternative A. Use of perennial bunch grasses would be reduced to the greatest extent under this alternative. This has impacts on plant community composition and habitat value. AML reduction in response to decreased WHB private water supply would further intensify these impacts.

Protection measures for WHB would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Alternative C would control WHB populations by maintaining AML as a single number, using four-year or longer gather cycles, and would not allow fertility control inhibitors to be used. This would cause the greatest impact from WHB on special status species habitat, but actions would still decrease the risk of soil compaction, trampling, and weed spread or introduction. Use of perennial bunch grasses would also be reduced. Special status species habitat value would be consequently impacted. However, AML reduction in response to decreased water availability for WHB would decrease impacts of WHB on special status species habitat.

Protection measures for WHB would be the greatest under Alternative C and would prohibit or limit such activities as motor vehicle racing in HMAs unless impacts were determined to be minimal.

This would protect special status species and their habitat from disturbance and would prevent impacts from human use, such as noise, trampling, and soil compaction.

Individual Effects under Alternative D

Impacts from population control measures and development of alternative water sources would be similar to those described under Alternative A.

Impacts from WHB protection measures would be similar to those described under Alternative A.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Wildfires could alter terrestrial or riparian habitats, which would also affect water quality and habitat components for special status wildlife and fish, such as LCT. Wildfires may leave the surrounding soil and accumulated ash vulnerable to erosion and remove shading streamside vegetation, which would increase sedimentation and water temperature. Special status aquatic species could also be subjected to the direct impacts of increased sedimentation and water temperatures from removal of upland vegetation. The duration, intensity, and scope of these direct impacts depend on the species and the characteristics of the fire.

Implementing a response to wildfires based on social, legal, and ecological consequences of the fire would prioritize special status species habitats for fire suppression, including the Lone Willow and Santa Rosa sage-grouse PMUs. This would prevent catastrophic destruction of habitat and would preserve native vegetation and diversity for sagebrush obligate special status species over the long term. Minimum impact suppression tactics would minimize unanticipated effects on habitats during fire suppression activities. Emergency stabilization and rehabilitation actions, such as seeding with native perennial species, would help restore degraded special status species habitat in the long term.

Fuels management actions would reestablish native vegetative communities, providing for healthy, diverse habitats over the long term. These actions would allow fire to play its natural role more frequently and would reduce the likelihood of catastrophic wildfire, which would protect habitats in the long term and over large areas. Implementing a response to wildfires based on social, legal, and ecological consequences of the fire and using fuel breaks would also prevent special status species habitat from catastrophic wildfire, which would have long-term effects.

Individual Effects under Alternative A

No additional impacts would occur from wildland fire management actions under Alternative A.

Individual Effects under Alternative B

Under this alternative, 110,167 acres of land would be designated as suitable for allowing fire for resource benefit. Special status species and their habitats could be directly disturbed in the short term, but their habitats would be improved and protected from catastrophic fire in the long term. Much of this land is sagebrush and higher elevation woodlands, so sagebrush obligate species, such as sage-grouse, and forest obligate species, such as northern goshawk, are most likely to be impacted by designating lands as suitable for allowing fire for resource benefit. Acreage of habitat for bighorn sheep and sage-grouse that could be directly impacted by allowing fire for resource benefit under

Alternative B are shown in Table 4-9. These areas represent a small portion of the habitat for these species, so impacts are likely to be localized.

Individual Effects under Alternative C

No additional impacts would occur from wildland fire management actions under Alternative C.

Individual Effects under Alternative D

Under Alternative D, 9,932 acres of land would be designated as suitable for allowing fire for resource benefit. This would protect special status species and their habitats from catastrophic fire in the long term. Allowing fire for resource benefit would directly disturb special status species and their habitat in the short term. Impacted species are similar to those described under Alternative B. In addition, cliffs and canyons also make up a large portion of the land designated as suitable for allowing fire for resource benefit under this alternative. As a result, special status bird and bat species that use this habitat type are most likely to be impacted under this alternative. Acreage of habitat for bighorn sheep and sage-grouse that could be directly impacted by allowing fire for resource benefit under Alternative D are shown in Table 4-9.

Table 4-9
Special Status Species Habitat Designated as Suitable for Allowing Fire for Resource Benefit

Habitat	Alternative B (acres)	Alternative D (acres)	Total Habitat within WDO (acres)
Desert bighorn sheep potential or occupied habitat	91,352	7,306	2,205,867
Sage-grouse Population Management Units habitat	49,423	6,851	3,147,932
Sage-grouse nesting habitat	38,490	1,742	2,209,502
Sage-grouse summer habitat	36,503	1,834	1,786,693
Sage-grouse winter habitat	49,640	5,050	2,992,488

Effects from Cultural Resources Management

Effects Common to All Alternatives

Protecting cultural resources would prevent disturbance and fragmentation of habitat, providing for a more healthy and resilient community. However, these protections may limit the type and timing of treatments that could be implemented to improve habitat value in certain areas. These areas are small relative to the overall WDO, so impacts would be localized.

Requirements for cultural resource inventories may prevent the timely completion of habitat projects or may be cost prohibitive for implementing habitat improvement projects.

Actions to maintain and protect pinyon and juniper stands in the Stillwater Range would improve special status species habitat over the long term, particularly for migratory birds. Some forest treatments, such as mechanical control measures, would directly disturb wildlife habitat in the short term but would indirectly foster a healthier ecosystem in the long term.

Individual Effects under Alternative A

Protecting pinyon trees in the Stillwater Range would prevent disturbance to special status species and their habitat and would maintain the extent of pinyon woodland in the short term.

Individual Effects under Alternative B

Alternative B would allow pinyon trees to be harvested in the Stillwater Range. These actions also would allow some special status species habitat disturbance and would slightly reduce the abundance of pinyon woodland in the short and long term. Depending on how these management actions were implemented, they could provide for improved special status species habitat in the long term.

Individual Effects under Alternative C

Impacts from protection of pinyon trees in the Stillwater Range are the same as those described under Alternative A.

Individual Effects under Alternative D

Impacts from protecting pinyon trees in the Stillwater Range are the same as in Alternative A, except Alternative D includes adaptive management to allow for some pinyon tree harvest. This would have a slightly greater impact on disturbance to special status species and their habitats in the short term.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consulting with tribes to identify culturally significant plants, important habitats, and traditional use locations would emphasize protection of natural resources. This would indirectly limit disturbances to special status species and would foster suitable wildlife habitat over the long term in certain areas. Consultation could place higher treatment priority in areas not previously identified or could limit actions in planned treatment areas. Impacts would vary on a case-by-case basis and are likely to be localized.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Physical conservation measures and law enforcement actions would prevent habitat degradation and disturbance to special status species, while potentially impacting the ability to implement habitat improvement treatments over the long term in certain areas. These areas are small relative to the total area of the WDO, so impacts would be localized.

Effects from Visual Resources Management

Effects Common to All Alternatives

Implementing VRM guidelines, particularly managing WSAs as Class I, would increase the difficulty of accomplishing habitat improvement actions and may affect the dimensions and locations of habitat treatments. These VRM guidelines would limit the extent or effectiveness of vegetation

treatments, such as weed treatments, because such treatments could change the visual character of vegetative communities. VRM Class I and II areas would prevent disturbances to special status species and their habitats but also would prevent certain lands from being treated effectively to improve habitat value.

Individual Effects under Alternative A

Under Alternative A, 420,271 acres and 346,302 acres would be managed to VRM Class I and II guidelines, respectively. These actions would limit the scope of habitat improvement activities and would prohibit treatments and prescriptions that would change the visual character. Overall, meeting VRM Class I and II guidelines would increase the difficulty of improving special status species habitat and would limit the extent and the effectiveness of the management goals. However, these areas would also limit direct disturbance to special status species.

Individual Effects under Alternative B

Under Alternative B, 417,605 acres and 391,203 acres would be managed to VRM Class I and II guidelines, respectively. This alternative is the least restrictive to habitat improvement treatments but these treatments could disturb special status species and their habitats in the short term. Impacts would be similar in nature to those described under Alternative A.

Individual Effects under Alternative C

Under Alternative C, 417,605 acres and 3,083,211 acres would be managed to VRM Class I and II guidelines, respectively. This alternative would be the most restrictive to implementation of habitat improvement projects. Impacts would be similar in nature, although greater in magnitude, than under Alternative A.

Individual Effects under Alternative D

Under Alternative D, 417,605 acres and 2,780,416 acres would be managed to VRM Class I and II guidelines, respectively. Impacts would be most similar in nature and magnitude to Alternative C.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

There are no effects common to all alternatives from cave and karst resource management.

Individual Effects under Alternative A

Alternative A would provide no protection to cave and karst resources. This could disturb special status bat species that use these areas and would allow for habitat degradation in the long term.

Individual Effects under Alternative B

Actions under Alternative B would identify and protect habitat for special status bat species in the long term. Education programs and mitigation measures would help minimize human impacts on these species and their habitat.

Individual Effects under Alternative C

Actions under Alternative C would identify and protect habitat for special status bat species in the long term. Education programs, prohibitions to disturbing activities, and measures to reduce visitation of cave and karst resources would be the most effective of all alternatives in minimizing human impacts on these species and their habitat.

Individual Effects under Alternative D

Effects would be similar to those described under Alternative B.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Collecting monitoring data may help to improve rangelands and lower weed spread by targeting areas most in need of rehabilitation and tracking the progress of restoration efforts. This would improve special status species habitat in these areas.

Protections given to newly developed spring sources and wetland-riparian areas could benefit special status species by protecting potential habitat from degradation and by providing additional sources of water for wildlife.

Individual Effects under Alternative A

Livestock grazing would be open on 8,232,727 acres under this alternative, which would have the greatest impact on special status species. Grazing, including grazing on acquired lands, allowing temporary nonrenewable use, and allowing for three consecutive years of grazing, would facilitate intensive land use. This would cause the most soil compaction, an indirect effect, and trampling of native vegetation, a direct effect, of all of the four alternatives. This alternative would also result in the most opportunity for weed seeds to be spread and new species of weeds to be introduced. The effects on perennial bunchgrasses would be the greatest under this alternative as well, but the Standards for Rangeland Health would still be expected to be met. However, any overuse would result in annuals or other less desirable species being able to invade these lands and dominate the understory. As a result rangeland vegetation would be less healthy, diverse, productive, and resilient. Overall, these actions would result in the slowest recovery rate of any impacted habitat for special status species. Any over use could reduce habitat value for special status species that use rangeland. Doing so could have a direct impact on these species. In addition, grazing may impact special status fish species, such as LCT, through increased sedimentation, stream bank trampling, vegetation removal, and habitat loss. However, actions would be implemented to mitigate livestock grazing impacts on special status species habitats. These include protecting riparian areas, using adaptive management principles (such as wildlife habitat objectives), allowing grazing permits to be relinquished, and establishing forage banks.

Lands closed to grazing on the remainder of land within the WDO would lower direct and indirect impacts on special status species and their habitats in these areas, as livestock would not be using vegetation, compacting soils, or acting as a mechanism for seed dispersal.

Allowing a change in livestock from cattle to sheep within the WDO could cause impacts on bighorn sheep, as disease transmission between domestic and wild sheep is a major threat to bighorn sheep populations. Impacts would be long term.

Developing springs for livestock would expand and enhance special status wildlife habitat. Proper installation of these features would minimize impacts on wetland and riparian areas from their construction and would reduce long-term impacts on these areas by providing an alternate water source for livestock and for special status species, creating suitable habitat where there previously was none. In addition, protecting riparian areas would benefit special status fish species, such as LCT.

Individual Effects under Alternative B

Livestock grazing would be open on 8,232,727 acres of land under this alternative. Grazing, including grazing on acquired lands, allowing temporary nonrenewable use, and allowing for continuous season-long use would facilitate the most intensive land use. Impacts would be similar in nature to those described under Alternative A.

Adaptive management principles, which include wildlife habitat objectives, as well as protection of riparian areas, would be implemented to mitigate livestock grazing impacts on special status species habitats. These actions would be difficult to implement successfully and efficiently under Alternative B, due to the large acreage that would be open to grazing.

Lands closed to grazing on the remainder of land within the WDO would reduce direct and indirect impacts on special status species and their habitat in these areas, as livestock would not be using vegetation, compacting soils, or acting as a mechanism for seed dispersal.

Allowing a change in livestock from cattle to sheep in areas occupied, or potentially occupied, by bighorn sheep could cause impacts on this species, even with buffer zones. Disease transmission between domestic and wild sheep is a major threat to bighorn sheep populations, and impacts would be long term.

Developing springs for livestock would have impacts similar to those described under Alternative A.

Individual Effects under Alternative C

Option 1

Livestock grazing would be open on 8,038,084 acres of land under this alternative. Grazing would facilitate weed spread and introduction similar to impacts described under Alternative B. However, Alternative C would not allow grazing on acquired lands or temporary nonrenewable use and would only allow for two years of consecutive grazing during the critical growth period. This would minimize the intensity of land use and would foster improved habitat value for special status species.

Lands closed to grazing on the remainder of land in the WDO would reduce impacts on rangeland vegetation in these areas, as livestock would not be using vegetation, compacting soils, or acting as a mechanism for seed dispersal. In addition, actions would be implemented to mitigate livestock grazing impacts on special status species habitats. These include protecting riparian areas, using

adaptive management principles that include wildlife habitat objectives, allowing grazing permits to be relinquished, and establishing forage banks.

Allowing a change in livestock from cattle to sheep within the WDO, excluding potential and occupied bighorn sheep habitat, would minimize impacts on bighorn sheep because disease transmission between domestic and wild sheep would be limited. Impacts would be long term.

Existing water developments would be required to provide water for wildlife from June 1 to September 30, regardless of whether livestock are present, which would provide additional water resources for special status wildlife during the drought season.

Option 2

Livestock grazing would be closed on all lands within the WDO, and grazing permits would be relinquished, which would have the greatest impact in achieving healthy ecological condition, resulting in the greatest improvement in both upland and riparian habitats for special status species on BLM-administered lands.

Impacts from riparian improvement actions are similar to those described under Alternative C, Option 1.

Developing springs for livestock would not occur, which would have the greatest impact by reducing impacts on special status species habitat since livestock and wildlife would not concentrate in these areas. This action would also not supply additional water to special status wildlife, further limiting their distribution.

Individual Effects under Alternative D

Alternative D would have 8,016,754 acres of land open to grazing. Impacts are similar to those described under Alternative A, except fewer acres would be open to grazing.

The greatest number of actions would be implemented to mitigate livestock grazing impacts on special status species habitats. These include protecting riparian areas, using adaptive management principles (such as wildlife habitat objectives), issuing grazing permits subject to land health standards and guidelines and other appropriate conditions, allowing grazing permits to be relinquished, establishing forage banks, and implementing strict requirements for authorizing TNR.

Impacts from conversion of livestock from cattle to sheep within potential and occupied bighorn sheep habitat are similar to those described under Alternative B.

Use of existing water developments would have impacts similar to those described under Alternative C, Option 1.

Effects from Minerals Management

Effects Common to All Alternatives

General

Minerals management impacts on special status plants and wildlife generally occur from surface disturbance and thus loss and fragmentation of habitat, as well as disturbances from noise and movement from the exploration, construction, and operation of facilities and roads. Management actions, as listed in Chapter 2, spell out where, how much, and what type of mineral exploration and extraction can occur. In addition, the types of restrictions, such as those on siting and operation, that can be applied vary by the type of mineral activity, whether they are salable, leasable, or locatable resources; for example, the WDO has the least discretion over locatables. Differences between the restrictions for each mineral resource are described in detail under the mineral resources environmental consequences (Section 4.3.2). Generally, the tighter the restriction, the fewer impacts on special status plants and wildlife.

Special status species habitat would be avoided in pursuing fluid and leasable mineral development and mineral material sales or disposal. As a result, impacts on special status species would be minimized. However, direct impacts on adjacent habitats could occur, including loss or injury of plants due to excavation or trampling or toxic responses from using chemicals in mineral extraction or waste pits. Indirect effects include increased exposure to dust and other contaminants associated with constructing and using access roads. This would reduce ecosystem health and habitat value in these areas and could impact habitat connectivity throughout the WDO.

In instances where conservation measures are not successful or where the identified buffers are inadequate the actions associated with mining could impact special status fish populations and aquatic habitats. The potential impacts on special status fish and aquatic habitats from mining include the following:

- *Increased sedimentation on fish-bearing streams.* Excess sediment generation can be the direct result of surface disturbances for mineral extraction, drilling, and facilities construction and also for road construction, maintenance, and use. Increased sedimentation in streams can affect special status fish populations in a variety of ways, including direct mortality, reduction in suitable spawning gravels, egg death, and individual fish displacement. Increased sedimentation resulting from mining could occur even if the mining activities are outside the buffer zones.
- *Introducing hazardous materials to fish-bearing rivers, streams, and lakes.* Hazardous materials from mining activities and from equipment use and maintenance could be released into fish-bearing water bodies. Associated with locatable minerals extraction are mine tailings, which can introduce heavy metals into aquatic ecosystems, impacting the health of special status fish and aquatic species and, consequently, other species due to biomagnification. Similarly, extracting fluid materials can release oil or other fluids, which could degrade water quality. Examples of this are the releases associated with well-flow testing for geothermal power development. Spills can also occur from equipment that uses hazardous fluids, such as gasoline and oil. The impact on special status fish populations depends on the type of

hazardous material released and the quantity of the release. If severe enough, deaths can occur and habitat can become unsuitable for aquatic life.

- *Altered stream flow regimes.* Water yield increase resulting from vegetation removal and alteration of natural drainage could result in scouring stream channel bottoms and decreasing fish habitat and food sources.
- *Changes in water temperatures.* Water temperature can increase in areas where streamside vegetation is removed, increasing the amount of sunlight reaching the water. The default buffers and management constraints would minimize the amount of mining that would occur in these sensitive areas. If mining were to occur in riparian areas, increased water temperatures could reduce suitable habitat for special status cold-water fish species. As water temperature increases, the amount of available dissolved oxygen for fish and aquatic invertebrates decreases.

Designation of areas as open to leasing but subject to terms and conditions of the standard lease form would limit the BLM's ability to assign major or moderate stipulations (such as NSO) in those areas. Consequently, there could be an increased impact on aquatic habitats in these areas. The standard lease stipulations include compliance with established acts, laws, and regulations governing BLM land management, which would protect special status fish species. Areas designated as open to leasing with NSO stipulations would provide some protection to aquatic habitats by limiting the amount of surface disturbance. Protection would be realized where NSO stipulations are applied to riparian areas and areas upslope of fish-bearing streams.

Impacts from salable minerals, typically gravel, tend to be small scale and localized. Impacts occur primarily from surface disturbance, but use restrictions and closures would minimize many impacts.

Impacts from fluid and solid leasables are also typically small scale and localized, but cumulative effects can occur where there are numerous oil and gas wells over the landscape. Impacts within the WDO would be minimized by use restrictions and closures.

Development of locatable mineral resources results in alteration of habitat from surface clearing performed for exploration purposes. Reclamation of disturbed areas using proper seed mix can help mitigate habitat alteration. Special stipulations would minimize impacts on special status wildlife habitats.

The reasonably foreseeable development scenario would continue to avoid sensitive habitats and could continue to fragment adjacent habitats and wildlife corridors. This could create reproductively isolated populations, which would lower genetic diversity in species with already low numbers. This would make species less fit and potentially more susceptible to disease and predation.

Individual Effects under Alternative A

Under Alternative A, the greatest amount of acreage would be open to leasable fluid and solid minerals activities and the fewest acres would be closed. Areas open to salable mineral materials disposal would be subject to stipulations only on a case-by-case basis, which would likely result in less wildlife resource protection. Alternative A maintains the greatest amount of acreage to locatable minerals, with only minimal closures. Approximately 60 percent of the area open to locatable minerals would be subject to requirements for special handling and additional stipulations for

wildlife resource protection. Alternative A would result in the greatest impacts from minerals management because it places the fewest restrictions on areas available for mineral development and the fewest restrictions on operations that could impact special status plants, wildlife, and fish.

Individual Effects under Alternative B

Under Alternative B, fewer acres would be open to leasable fluid and solid minerals activities, and more acres would be closed than under Alternative A. Acreage open to salable mineral materials disposal would be similar to Alternative A, but most of the area would be subject to standard authorization terms, which would likely result in greater special status species resource protection than under Alternative A. Impacts from salable minerals management would be the same as those under Alternative A.

Individual Effects under Alternative C

Under Alternative C, the fewest acres would be maintained for locatable minerals and leasable fluid and solid minerals activities, and the greatest number of acres would be closed. Acreage open to salable mineral materials disposal would be less than under Alternatives A and B, and most of the area would be acres open solely to permitted government agencies. This would likely result in increased resource protection from proper management and resource consideration in pursuing mineral interests. Overall, Alternative C would result in the least amount of impacts on special status plants, wildlife, and aquatic resources from minerals management. This is because Alternative C would close the most area to mineral development and would place the most restrictions to protect wildlife resources in areas available for mineral development.

Individual Effects under Alternative D

Effects are similar to those described under Alternative B, except more acres would be closed to mineral development and more acres of the public lands open to leasing would be subject to NSO stipulations and seasonal closures to protect resources, including special status wildlife. Alternative D would have the fewest acres open to salable mineral materials disposal. Standard authorization terms and seasonal closures would be applied in some areas and would reduce impacts on special status wildlife and their habitats.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Managing BLM-administered lands to provide dispersed recreation could directly impact special status species habitat throughout the WDO through trampling and human disturbance. Indirect effects include soil compaction, weed introduction or spread, and increased dust. Impacts would vary, depending on the type of activities allowed in the area, and could be short term and long term.

To manage OHV use, the Transportation Plan would be updated and would account for wildlife habitat, including special status species habitat. Specific sites would undergo NEPA analysis to minimize impacts on special status species habitat.

Individual Effects under Alternative A

Under Alternative A, there would be no camping limitations or prohibitions throughout the WDO. As a result, dispersed recreation would occur, causing localized and short-term impacts, including those caused by increased road use in remote areas and camping. Guidelines recommended to the public could help to reduce impacts associated with dispersed recreation.

In addition, the Pine Forest SRMA would be maintained, and issuance of special recreation permits would be the least restricted.

The greatest acreage (6,782,790 acres) would be open to OHVs under Alternative A, with the least amount of land (416,652) limited, and with 24,832 acres closed. Combined, these actions could disturb special status species and degrade their habitats through increased human presence, OHV use, and trail creation, which could compact soils, trample vegetation, and increase noise and dust. These effects could decrease special status species habitat value and drive special status species out of certain areas throughout the WDO. Areas limited and closed to OHV use would have fewer impacts than areas open to OHV use because vehicles would be restricted to roads and trails that already have minimal habitat value.

Individual Effects under Alternative B

Camping limitations and prohibitions throughout the ERMA would minimize impacts from dispersed recreation on special status species and their habitat on these lands. In addition, designating three SRMAs would impact special status species and their habitat to varying degrees depending on the recreation market identified for the SRMA. For example, the Nightingale SRMA would be targeted for undeveloped recreation-tourism, which would have less of an impact than Winnemucca and Pine Forest SRMAs, which allow for increased motorized vehicle access. Impacts would be localized and associated with human disturbance, such as increased noise causing certain species to avoid heavily used areas. Of particular interest is impacts on the Humboldt serican scarab beetle (*Serica humboldti*), which inhabits the Winnemucca Sand Dunes RMZ within the Winnemucca SRMA. Very little is known about the beetle's life history or habitat requirements, so impacts would be difficult to identify or define. Impacts could be long term if the species is very sensitive to habitat or human disturbance.

Under Alternative B, 1,460,200 acres would be open to OHVs, with the least amount of land (24,832 acres) closed, and with 5,445,218 acres limited. Together, impacts from these actions include soil compaction, noise, trampling of vegetation, wildlife disturbance, and increased dust. These impacts could decrease plant vigor, alter stand composition, and lower habitat value of areas throughout the ERMA, SRMAs, and OHV routes. Areas limited and closed to OHV use would have fewer impacts than areas open to OHV use because vehicles would be restricted to roads and trails that already have minimal habitat value. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan were updated and site-specific NEPA analysis were completed.

Issuance of special recreation permits would be the least restricted under this alternative, which could cause some impacts on special status species and their habitats through increased human use, trampling, soil compaction, and noise disturbance.

Individual Effects under Alternative C

Camping limitations and prohibitions throughout the ERMA would minimize impacts from dispersed recreation on special status species habitat on these lands. In addition, designating two SRMAs would have similar impacts on habitat and special status species as those described under Alternative B. However, the Winnemucca Sand Dunes RMZ would not be designated under Alternative C, so impacts on the Humboldt serican scarab beetle would not be a concern.

Under Alternative C, 0 acres would be open to OHVs, with 61,427 acres closed and 7,143,177 acres limited. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan were updated and site-specific NEPA analysis were completed. As such, impacts from recreation actions would be fewest under this alternative, as it would be the most restrictive and prohibitive. Impacts would occur, however, and they would be similar in nature to Alternative B.

Issuance of special recreation permits would be the most restrictive under Alternative C and would cause the fewest impacts on special status species and their habitat through increased human use, trampling, soil compaction, and noise disturbance.

Individual Effects under Alternative D

Camping limitations and prohibitions throughout the ERMA would minimize impacts from dispersed recreation on special status species and their habitat on these lands. In addition, designating three SRMAs would have the same impacts on special status species as Alternative B.

Under Alternative D, 289,932 acres would be open to OHVs, with 35,483 acres closed and 6,878,592 acres limited. Areas limited and closed to OHV use would have fewer impacts than areas open to OHV use because vehicles would be restricted to roads and trails that already have minimal habitat value. Open areas under Alternative D were identified to avoid important wildlife habitats that would reduce impacts from open OHV use. To minimize impacts, the BLM would limit OHV use to existing roads and trails until the Transportation Plan were updated and site-specific NEPA analysis were completed. Impacts from OHV use are similar to those described under Alternative B.

Issuance of special recreation permits would cause some impacts on special status species and their habitat through increased human use, trampling, soil compaction, and noise disturbance.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Impacts on special status species habitat could occur with issuance of new ROWs, which require vegetation clearing, access roads, power lines, and infrastructure and would disturb or destroy vegetation and wildlife habitat in localized areas. ROWs may spread or introduce weeds, reducing habitat value. However, BMPs, stipulations, and mitigation measures would be implemented to minimize impacts on suitable habitat.

Wind turbines can kill special status bird and bat species. Impacts would vary, depending on the number and type of turbines erected. Implementation of avoidance or exclusion areas would eliminate or mitigate impacts in important habitats.

Individual Effects under Alternative A

Effects are the same as those under Effects Common to All Alternatives.

Individual Effects under Alternative B

Adverse effects from renewable energy developments, as described under Effects Common to All Alternatives, would be reduced by designating 716,528 acres as avoidance areas.

Individual Effects under Alternative C

Renewable energy would have the least impact on special status fish, plants, and wildlife under Alternative C due to the designation of 1,279,481 acres as exclusion zones and 869,645 acres as avoidance zones. No overhead transmission lines, ROWs, or nonrenewable energy projects would be allowed in exclusion zones. In addition, undue adverse impacts would be reduced through development of lease stipulations and mitigation measures.

Individual Effects under Alternative D

Effects are similar to those described under Alternative C, but Alternative D would be less effective at protecting special status resources. The total overall acreage designated as avoidance and exclusion zones for the renewable energy project is 123,230 acres fewer under Alternative D, and the area designated as exclusion zones is 579,552 acres fewer than under Alternative C. In addition, undue adverse impacts would be reduced through development of lease stipulations and mitigation measures.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Maintaining or improving existing roads would be beneficial to special status species and their habitat because these actions would reduce erosion, runoff, and noxious weed introduction and spread. However, roads and trails can alter habitats, reduce wildlife security areas, increase road kill, and alter wildlife home ranges and migration corridors. In addition, roads near or crossing streams and other aquatic habitats could impact special status fish species through sedimentation, polluted runoff, and habitat degradation or loss. The magnitude of these impacts varies by species, habitat types, size and traffic volume of roads, and seasonal use. Vehicles can degrade wildlife habitats from surface disturbance and can displace and stress animals.

Maintaining roads necessary for fire suppression would allow access to special status species habitat and would allow for suppression of wildfires when necessary. This would help achieve suitable habitat conditions and would protect special status species from direct mortality in the long term.

Noxious weed control measures would prevent the spread of weeds into special status species habitat, would prevent competition with native species, and would help achieve suitable habitat conditions in the long term.

Individual Effects under Alternative A

Decommissioning roads that present problems to the environment would reduce impacts on special status wildlife and habitat in select locations.

Individual Effects under Alternative B

Under Alternative B, roads that present problems to the environment would be decommissioned only if alternative access were provided. The same condition would apply to removing, rerouting, and rehabilitating roads that adversely affect special status wildlife and habitat. Creating alternative access could result in additional impacts on resources, but Alternative B would require that roads be constructed to avoid creating fragment resource tracts. Impacts would further be reduced by temporary road closures during the wet season, which would minimize sediment and erosion impacts.

Individual Effects under Alternative C

Effects are similar to those described for Alternative B, but alternative access would not be a stipulation for decommissioning, removing, rerouting, or rehabilitating roads that are adversely impacting special status wildlife. Of all the alternatives, Alternative C provides the most assertive approach for minimizing and avoiding impacts on special status wildlife or habitat from transportation management.

Individual Effects under Alternative D

Effects are similar to those described for Alternative C, but Alternative D would be less effective than would Alternative C because it contains fewer specific actions for minimizing and avoiding impacts on special status wildlife and habitat.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Special status species habitats would be given consideration when the WDO makes disposal and acquisition decisions. Impacts on special status species would be minimized since only lands with little resource values were identified for disposal and further NEPA documentation would minimize potential impacts on habitat. Land acquisition would provide additional opportunities to recover special status species and their habitats by placing them in public ownership under BLM management, thereby making them subject to the laws and regulations that would guide management of them. Effects would be long term.

ROWs cause habitat alteration from their footprint for the facilities that are authorized. These areas are usually localized and small, although impacts could cause a cumulative impact on the landscape scale over the long term. ROWs could cause habitat fragmentation for special status plants and small wildlife but are unlikely to cause considerable fragmentation for larger wildlife. Further, protection for special status species would preclude ROW placement in sensitive habitat and would prevent impacts on species. For example, sage-grouse protection would prevent large transmission lines in sensitive areas near leks.

Individual Effects under Alternative A

Issuance of ROWs would not be limited, and avoidance areas or exclusion zones for lands and realty management actions would not be designated under Alternative A. Special status species and their habitats could be impacted by vegetation removal, soil compaction, habitat disturbance and fragmentation, noise, weed invasion, and increased dust.

Individual Effects under Alternative B

Designating avoidance areas would have impacts similar to renewable energy management actions.

Lack of restriction on ROW issuance could impact special status species and their habitats through vegetation removal, soil compaction, habitat disturbance and fragmentation, noise, and increased dust.

Individual Effects under Alternative C

Designating avoidance areas and exclusion zones would have similar impacts as renewable energy management actions.

Restriction on ROW issuance could impact special status species and their habitat by protecting and limiting vegetation disturbance, habitat fragmentation, and weed invasion or spread from road construction.

Individual Effects under Alternative D

Designating avoidance areas and exclusion zones would have similar impacts as renewable energy management actions.

Lack of restriction on ROW issuance could impact special status species and their habitat through vegetation removal, soil compaction, habitat disturbance and fragmentation, and increased dust.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

Actions within ACECs could impact special status species habitat, but mitigation measures would be developed to prevent impacts on special status species habitat within ACECs over the long term.

Individual Effects under Alternative A

Maintaining the Osgood Mountain Milkvetch ACEC would protect vegetation and habitat and would prevent disturbance and fragmentation of suitable habitat for this species within the ACEC. This ACEC is small relative to the total area of the WDO, so impacts would be localized.

Individual Effects under Alternative B

Effects from ACEC/RNA management under Alternative B are the same as those described under Alternative A.

Individual Effects under Alternative C

Designating four ACECs within the WDO would provide the greatest protection to special status species and their habitat and would prevent disturbance and fragmentation of habitat within these ACECs. The Pine Forest ACEC, in particular, was proposed to protect habitat for several wildlife species, some of which are sensitive, including American pika, Humboldt yellow-pine chipmunk, northern goshawk, sage-grouse, California bighorn sheep, pygmy rabbit, and an array of sagebrush obligate species.

Individual Effects under Alternative D

Effects from ACEC/RNA management under Alternative D are the same as those described under Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Backcountry byways may attract more tourism to areas they access and could increase human use and degradation of special status species habitat. They also could increase direct noise disturbance to special status species. Adverse impacts from BCBs are expected to be limited to relatively small areas.

Effects from National Trails Management

Effects Common to All Alternatives

Beneficial impacts on special status species and habitat would result from national trails management actions since habitat disturbance would be reduced in the protected zone of the trail. However, habitat improvement projects may be prevented within this zone, which would have small-scale localized impacts.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no effects common to all alternatives from wild and scenic rivers management.

Individual Effects under Alternative A

No WSRs would be managed under Alternative A; without WSRs, there would be less protection given to rivers or riparian areas within the WDO. As such, impacts on special status species and their habitat would not be restricted, including impacts resulting from increased use such as soil compaction, noise, and trampling.

Individual Effects under Alternative B

No WSRs would be managed under Alternative B, and impacts are similar to those described under Alternative A.

Individual Effects under Alternative C

WSRs would be managed under Alternative C and would limit other uses. As a result, there would be limited impacts on special status species and habitat.

Individual Effects under Alternative D

No WSRs would be managed under Alternative D, and impacts would be similar to those described under Alternative A.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Lands with Wilderness Characteristics

There are no effects common to all alternatives from wilderness characteristics management.

Wilderness Study Areas

The WDO does not have discretion regarding management of designated WSAs because they must comply with the Interim Management Policy and Guidelines for Lands under Wilderness Review (IMP, BLM Manual Handbook H-8550-1) (BLM 1995). WSAs would provide relatively undisturbed special status species habitat in areas within the WDO. However, WSAs would increase the difficulty of accomplishing habitat improvement treatments. This is because protections to WSAs would limit the extent or effectiveness of vegetation treatments, such as weed treatments, because any type of mechanized work would be limited on these lands. Such protections would also prevent disturbances to special status species and their habitats but also would prevent certain lands from being treated effectively to improve habitat value. WSAs are defined and distinct within the WDO, so impacts would be localized.

Individual Effects under Alternative A

Alternative A would be the least restrictive of activities on lands outside of WSAs with wilderness characteristics. This could degrade special status species habitat by increased noise, trampling, disturbance, and soil compaction. Areas with wilderness characteristics are small, relative to the total area of land in the WDO, so impacts would be localized.

Individual Effects under Alternative B

Under Alternative B, the BLM would manage six areas containing wilderness characteristics to meet multiple use and sustained yield objectives. This would protect special status species habitat but could allow some impacts from allowing multiple uses.

Individual Effects under Alternative C

Under Alternative C, as under Alternative B, the BLM would manage six areas containing wilderness characteristics. This alternative would impose restrictions and stipulations in these areas, including

closure to mineral leasing and ROW exclusion zones, which would benefit special status species resources.

Individual Effects under Alternative D

Under Alternative D, the BLM also would manage six areas containing wilderness characteristics. Depending on the restrictions implemented, some impacts on special status species habitat could occur. However, restrictions would protect special status species habitat in the long term.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

WWV sites are unlikely to impact special status species or their habitats because WWV sites and special status species are highly localized and the total impacted area would be small, relative to the overall size of the WDO.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Closure of dangerous, accessible mine shafts and adits could impact special status bat species if they were to occupy these areas. To minimize potential impacts on bat species, the shafts and adits would be closed in consultation with NDOW and properly constructed bat gates would be used to close adits that are important bat habitat.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Sustainable development management actions apply to areas that have already been developed and likely have little habitat value for special status species. Because sustainable development management actions would involve facility reuse, new operations would not create new disturbance. As a result, there would be few impacts on special status species from sustainable development management actions.

Individual Effects under Alternative A

Impacts on fish and wildlife are not likely to occur under Alternative A.

Individual Effects under Alternative B

Reuse of sites could have detrimental impacts on special status species, but the effects would vary depending on the type of reuse and management of the use. Provisions to protect natural resources, including important habitats, would minimize potential impacts from sustainable development.

Individual Effects under Alternative C

Impacts are similar to those described under Alternative B, except Alternative C stresses no net loss of public lands. This would provide more protection to special status species and their habitat in the long term.

Individual Effects under Alternative D

Impacts are similar to those described under Alternative B, except Alternative D details criteria for reuse, which would focus sustainable development only in the most suitable areas.

Cumulative Effects

Special status species are threatened by reduction and decreased quality of sagebrush and salt desert scrub habitats from fire and invasive plants; loss and degradation of wetland, aquatic, and riparian habitats from grazing use; and declines in fish and bird populations from the loss and degradation of riparian and aquatic habitats. These trends are likely to continue unless habitats and migratory corridors are protected.

Further loss of aquatic habitat has occurred from the increased presence of invasive plants, drought, diversion of water from natural waterways for livestock use, and increased recreational and commercial activities. Drought and wildfire will continue to contribute to the loss of aquatic resources, and impacts may become more severe in the future because of global warming. Management actions in the RMP aim to address, minimize, and in some cases mitigate for impacts from grazing and commercial and recreational activities. In addition, management actions to reduce hot season grazing in riparian areas and reduction or maintenance of appropriate management levels for wild horse and burro populations would reduce future impacts on wetland and riparian areas.

Most of the cumulative projects have or will affect special status species or their potential habitat. Population increases, increased development in the area, fire, increases in recreational activities and OHV use, habitat encroachment, and mineral development have the potential for the greatest effects. These actions and their interactions result in the loss of and changes in terrestrial and aquatic habitats, resulting in degraded quality of these habitats and the populations they support. The above actions directly and indirectly result in changes in vegetation species composition and structure. On public lands, these changes in vegetation have an effect on wildlife, whereas development on private lands results in the complete loss of habitats under the footprint of infrastructure.

In the foreseeable future, implementing the RMP would put numerous new mitigation, restoration, and conservation measures in place that would reduce the potential extent and severity of effects from other actions. Actions on BLM lands would have a noticeable effect at the local level, and because of the area encompassed by the WDO, the Winnemucca RMP's contribution to cumulative effects on special status species throughout the western states is noticeable.

The same types of cumulative effects would occur under all alternatives. Generally, Alternative C would contribute the greatest potential for improvement in plant, wildlife, and aquatic habitat because of management actions, mitigation measures, and restrictions designed to improve habitats.

4.2.11 Wild Horse and Burro

Summary

The Wild and Free-Roaming Horses and Burros Act of 1971 and BLM policy state that wild horse and burro populations will be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat. The goal is to protect, manage, and control healthy, self-sustaining wild horse and burro populations within established herd

management areas (HMAs) at appropriate management levels (AMLs) in a manner designed to achieve and maintain a thriving natural ecological balance and multiple-use relationship on public lands. Healthy, self-sustaining wild horse and burro populations in the HMAs depend on maintaining herd numbers and breeding sex ratios sufficient to maintain necessary genetic diversity and maintaining herd numbers commensurate with the ability of the range to provide necessary water and forage and on limiting disturbance from people, vehicles, and industrial activity.

Each alternative has a different emphasis, which is expected to result in different priorities for resource development. These priorities are expected to result in higher probabilities for adverse impacts on WHB populations and habitat resources under some of the alternatives.

Alternative A represents current management under guidance of the 1982 Sonoma-Gerlach and Paradise-Denio Management Framework Plans and the amendments of 1999. Alternative A contains fewer, and generally less specific, management actions than the other alternatives. It represents the status quo.

Alternative B generally prioritizes development of resources for economic return while relying on mitigation to reduce, rather than prevent, adverse impacts. Alternative B would likely have greater impacts on WHB than would Alternative C and Alternative D. However, B is the only alternative that does not allow for the occupancy of elk to occur on BLM lands, which lessens overall habitat competition impacts on WHB.

Alternative C is the most protective of natural resources because it involves the least new development, exclude potentially impactful uses, and prioritize protection and restoration of resources when conflicts among uses occur. Option 1 emphasizes protection of wildlife habitat over WHB and allows for minimal development of WHB habitat. Alternative C, Option 2, removes all livestock grazing and is thus considered the best alternative for WHB. No livestock grazing would decrease competition for forage and water resources with WHB, would remove fence impediments, and would lessen disturbance by cattle on WHB forage areas. However, Alternative C may impact WHB by reducing AML in lieu of developing WHB waters and by allowing elk populations to occur.

Alternative D represents a compromise between preservation and development. It attempts to balance appropriate multiple uses and manages for a healthy environment. It allows the greatest flexibility of potential management tools. Therefore, Alternative D impacts on WHB are expected to be generally intermediate between Alternative B and Alternative C (Option 1).

Methods of Analysis

Methods and Assumptions

This analysis is based on the following methods and assumptions being generally beneficial to wild horses and burros.

A thriving natural ecological balance exists when the cumulative effect of approved multiple uses in an HMA do not cause unacceptable impacts on or deterioration of the rangeland resources. Balance among multiple uses exists when approved uses are compatible and no one use threatens or impairs the viability and sustainability of another use. The following conditions all contribute to the health and well being of wild horses and burros:

- Maintaining healthy native plant communities, particularly grasses;
- Increasing forage opportunities;
- Reducing competition from domestic livestock;
- Preventing wild and domestic horses and burros from mixing;
- Improving range conditions;
- Maintaining or improving water sources;
- Eliminating barriers to movement; and
- Restricting OHVs or limiting other potential disturbance from people, vehicles, and industrial activity.

Managing and adjusting herd numbers based on monitoring grazing use, trends in rangeland conditions, climatic conditions, actual use, and rangeland carrying capacity, in balance with other uses, is beneficial to wild horses and burros. These actions prevent overpopulation, which could lead to overgrazing and rangeland deterioration, which in turn could lead to impaired herd health.

The section identifying effects common to all resources delineates the management activities that promote, aid, enhance, or cause negative effects on wild horses and burros. Management of the following would have little to no effect on wild horses and burros: air quality, geology, cultural resources, tribal consultation, paleontological resources, visual resources, cave and karst resources, areas of critical environmental concern, and public safety.

Effects from Air Quality Management

Effects Common to All Alternatives

Air quality has little or no direct or indirect effect on wild horses and burros. All alternatives meet air quality standards.

Effects from Geology Management

Effects Common to All Alternatives

Rock-hounding and casual observation of geological structures or collecting geologic materials are not expected to have any direct or indirect effects on wild horses and burros.

Effects from Soil Resources Management

Effects Common to All Alternatives

Healthy uplands, watersheds, and soils would likely increase the potential for increased forage and water productivity, which would indirectly benefit wild horses and burros. Reducing erosion and maintaining or improving soils and vegetative cover and reclaiming disturbed areas could indirectly benefit wild horses and burros by increasing forage plants and maintaining or improving the plant communities.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Alternative A manages to maintain and improve the soil processes through:

- Implementation of the Standards for Rangeland Health;
- Prevention of undo degradation by mining activities through the use of BMPs and SOPs (Appendix B);
- Implementing grazing management systems; and
- Using native and introduced seeds in fire emergency stabilization treatments and burned area rehabilitation.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Alternative B manages to maintain and improve the soil processes through:

- Implementation of the Standards for Rangeland Health;
- Prevention of undo degradation by mining activities through the use of BMPs and SOPs (Appendix B);
- Implementing grazing management systems; and
- Using introduced seeds in fire emergency stabilization treatments and burned area rehabilitation.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Alternative C manages to maintain and improve the soil processes through:

- Implementation of the Standards for Rangeland Health;
- Prevention of undo degradation by mining activities through the use of BMPs and SOPs (Appendix B);
- Implementing grazing management systems; and
- Using only native seeds in fire emergency stabilization treatments and burned area rehabilitation (most restrictive on uses).

Ensuring reclamation with proper species, salvage of growth materials and applying amendments, and improving soils in Alternative C protects forage for wild horses and burros.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Alternative D manages to maintain and improve the soil processes through:

- Implementation of the Standards for Rangeland Health;
- Prevention of undo degradation by mining activities through the use of BMPs and SOPs (Appendix B);
- Implementing grazing management systems; and
- Using native and introduced seeds in fire emergency stabilization treatments and burned area rehabilitation with greater flexibility in management options than under Alternative A.

A mandate to achieve reclamation with appropriate species, to salvage growth materials, and to use amendments under Alternative D would be beneficial to wild horses and burros by helping to ensure additional forage opportunities.

Effects from Water Resources Management

Effects Common to All Alternatives

Acquisition and development of new sources and protection of watersheds and protection of existing sources, quantity, quality, and access would generally directly benefit wild horses and burros.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Alternative A would be less beneficial to wild horses and burros by not providing long-term sustainable water because watersheds are specific to municipalities or threatened and endangered species.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Specifying long-term sustainable water and promoting commercial development with unrestricted water importation and exportation under Alternative B could be least beneficial if the exported water were critical to wild horses and burros.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Under Alternative C, requiring full mitigation, providing long-term sustainable water, acquiring water rights, and managing the watershed to benefit the resources for which it was created would be less beneficial to wild horses and burros because their use would be subordinate to other uses.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Providing long-term sustainable water and acquiring water rights would directly benefit wild horses and burros. Alternative D would be somewhat beneficial for wild horses and burros because it

proposes to use more avenues for acquisitions than the other alternatives would. It would use the state permitting process, land acquisitions, and other realty actions to acquire minimum pool in-stream flows or to gain access to water sources and developments for other resources.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

Management of forest and woodland species to provide a variety of habitats would indirectly impact wild horses and burros by providing palatable browse species and shelter areas, as long as they do not encroach on the native grasses to any great extent.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Prescribed burns and harvest under Alternative B would be more beneficial to wild horses and burros in the long-term by increasing the opportunity for better range conditions and forage opportunities.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Alternative C ,specifying no harvest and no prescribed fire would be less beneficial to wild horses and burros by providing fewer opportunities for improvement of range and forage in the long-term.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

Control and reduction or eradication of noxious weeds would provide the potential for improved forage for wild horses and burros by increasing the potential for the growth of forage plants.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Alternative A would contribute less to forage improvement by not specifying cooperation with other entities, not developing new programs, and not promoting public education in weed control.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Alternatives B and D, which specify cooperating with other entities, developing new programs, and promoting public education in weed control, would promote forage improvement that would be more beneficial to wild horses and burros.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Alternative C , which specifies cooperating with other entities, developing new programs, and promoting public education in weed control would promote forage improvement that would be beneficial to wild horses and burros.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Alternatives D and B, which specifies cooperating with other entities, developing new programs, and promoting public education in weed control would promote forage improvement that would be beneficial to wild horses and burros.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Vegetation control may indirectly benefit wild horses and burros by reducing or eliminating unpalatable and undesirable species, as long as the method of control is not harmful to the animals.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

No biological control and no coordination with other agencies and groups under Alternative A may be less beneficial to control undesirable vegetation than use of biological controls, thus reducing the ability to provide better forage opportunities.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Depending on the pesticides used, method of application, and proximity to HAs and HMAs, chemical control could have a positive effect by controlling or eliminating some unpalatable species, or it could have a negative effect because the chemicals may be harmful to wild horses and burros.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Biological control and coordination with other agencies and groups under Alternative C, along with the use of biological controls, would be beneficial to control undesirable vegetation. This would benefit wild horses and burros by providing better forage opportunities and not exposing the animals to potentially harmful pesticides.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Using biological, chemical, and mechanical control and coordination with other agencies and groups in Alternative D is more likely to control undesirable vegetation. Control of undesirable vegetation would benefit wild horses and burros by providing better forage opportunities, as long as the methods used are not harmful to the animals.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Healthy, productive, diverse, and resilient plant communities throughout their range would provide good forage opportunities for wild horses and burros. Healthier rangelands would also result in healthier watersheds, both of which would be beneficial to wild horses and burros by increasing forage and water availability. Seeding native or introduced plants may be beneficial to wild horse and burro foraging. Eliminating, restricting, or controlling grazing would benefit wild horses and burros by likely improving ecological conditions and reducing forage competition with livestock. Resting areas from grazing after fires would allow seeded forage plants to become well established without the stress from over-trampling and grazing by livestock. Improving ecological conditions should result in improved health, vigor, and abundance of forage, as well as water and spatial distribution across the habitat.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Specifying improvement of degraded rangeland and use of native seed for reclamation under Alternative C, Option 1 would be beneficial to maintaining healthy rangeland and forage for wild horses and burros. Option 2 with no prescriptive grazing would be beneficial to wild horses and burros by reducing competition with livestock.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Specifying improvement of degraded rangeland and use of native seed for reclamation under Alternative D would be beneficial to maintaining rangeland and forage for wild horses and burros. Monitoring range conditions could lead to managing for reductions in the number of wild horse and burro numbers, which could be beneficial in that the range could better accommodate the remaining animals.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Preservation, reclamation, and improvement of wetland and riparian areas and meadows would be beneficial to wild horses and burros by providing the potential for additional forage areas and preservation of potential water sources.

Individual Effects under Alternative A

With no numerical goals for PFC, Alternative A would likely be least effective in improving range conditions and water availability for wild horses and burros.

Individual Effects under Alternative B

Exclusion fencing in Alternative B could reduce availability of the area for wild horse and burro grazing and water access and could inhibit their free-roaming nature.

Individual Effects under Alternative C

Removing livestock as specified in Alternative C, Option 2, would be beneficial to wild horses and burros by reducing competition for available forage and water and improving range conditions and water availability.

Individual Effects under Alternative D

Impacts would be the same as those identified under Alternative C.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Wildlife habitat protection measures would decrease forage, water, and the free-roaming nature of wild horses and burros. Guzzlers are not beneficial to wild horses and burros, who are excluded from guzzlers. Introducing or increasing numbers or species of big game, especially those that have dietary overlap with cattle and horses (such as elk), would increase competition for available forage and would be detrimental to wild horses and burros. Reducing barriers to big game movement could benefit wild horses and burros if it provided the potential for easier herd movement. Additional hunting through additional permits or additional game species could increase herd disturbance.

Individual Effects under Alternative A

Alternative A would be beneficial to wild horses and burros because it allows development of springs (water sources) for wild horses and burros. However, it would not be beneficial in that it specifies fencing, which negatively affects the free roaming nature of wild horses and burros**.**

Individual Effects under Alternative B

Alternative B allows for development of springs (water sources) for wild horses and burros. Eliminating pioneering elk populations under Alternative B would be beneficial to wild horses and burros by reducing competition for forage and water.

Individual Effects under Alternative C

Alternative C ,imposing use restrictions, could be beneficial to wild horses and burros by reducing the possibility of human disturbance and providing additional water sources. Alternative C could be somewhat less beneficial by requiring removal of artificial water sources. Alternative C also does not allow for spring development for wild horses and burros. Alternative C could accept pioneering elk, which would increase competition for forage and water.

Individual Effects under Alternative D

Use of management tools (except fencing), such as prescribed fire and allowing fire for resource benefit, vegetation manipulation (mechanical, biological, and chemical treatments), seeding, and use restrictions, would be beneficial to wild horses and burros by increasing the likelihood of healthy range conditions and increased forage opportunities in the long term. Alternative D allows for development of springs (water sources) for wild horses and burros. Alternative D could accept pioneering elk, which would increase competition for forage and water and increased disturbance due to elk hunting.

Effects from Special Status Species Management

Effects Common to All Alternatives

Zones of no surface occupancy, buffer zones, human activity restrictions, and areas of no surface disturbance could be beneficial to wild horses and burros by limiting the opportunity for disturbance and the potential for range degradation. Any actions, such as fencing or restricting wild horse and burro access to sage-grouse or pygmy rabbit habitat, could be detrimental by restricting access to forage or by limiting their free-roaming nature. ES&R treatments may require removing wild horses and burros to protect areas treated.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Management of wild horses and burros would help assure healthier herds by preventing overpopulation that could lead to overgrazing ranges, damage to riparian areas, and increased competition with domestic stock and other wildlife. Flexibility and numerical ranges in management options, and allowing adjustments based on observed conditions would generally be better than rigidity because wild horse and burro herds are dynamic units.

Maintaining current MOUs and developing interagency and interoffice MOUs would coordinate and standardize management to prevent individual management plans that are at odds with one another and reduce any possible interagency conflicts regarding proper management. This would also facilitate the dissemination of information and innovative management practices among agencies.

Allowing unencumbered access to water within HMAs could be beneficial to herds but detrimental to riparian vegetation.

Protection from harm, harassment, and illegal capture would help preserve the herds and enhance their attractiveness to the public as wild and free animals.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

Implementing appropriate management actions primarily to WHB before livestock under conditions where allotment-specific objectives and the Standards for Rangeland Health are not being met would directly impact wild horses and burros by maintaining AUMs for livestock and by reducing AMLs for wild horses and burros.

Individual Effects under Alternative C

By not using fertility control methods to maintain a four year gather cycle, wild horse and burro herds could overpopulate at an increased rate that may not be able to be sustained by the existing habitat. As a result, the need for more horse gathers would be necessary to prevent starvation and maintain healthy herds and habitat.

Implementing appropriate management actions primarily to livestock before wild horses and burros under conditions where allotment-specific objectives and the Standards for Rangeland Health are not being met would directly benefit wild horse and burros by maintaining AMLs for wild horses and burros and by reducing AUMs for livestock.

Individual Effects under Alternative D

Effects of implementing appropriate management actions would occur to wild horse and burros or livestock relative to the degree to which each animal species is contributing to the non-attainment of resource objectives (if known) or proportionally (if unknown). This could directly impact wild horses and burros by either reducing wild horse and burro AMLs or livestock AUMs.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Protecting range improvements and natural resources and managing for healthy, productive, diverse, and resilient plant communities are beneficial to wild horses and burros by providing forage species diversity and improving forage opportunities. Allowing for natural fire regimes to take place would contribute to a natural healthy range condition.

Because fire retardants are composed largely of nitrogen and phosphorus fertilizers, they may influence vegetation. Fire retardants may encourage growth of some species at the expense of others, resulting in changes in community composition and species diversity. Differential growth may also influence herbivorous behavior; both insect and vertebrate herbivores tend to favor new, rapidly growing shoots.

Fire closures would reduce the possibility for humans to disturb wild horses and burros.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Limitations on OHV use around culturally sensitive areas could be beneficial to wild horses and burros by reducing the possibility for human disturbance. Some sites could draw additional visitors, which could increase the potential for wild horses and burros to be disturbed.

Effects from Tribal Consultation

Effects Common to All Alternatives

Tribal consultation would have little to no effect on wild horses and burros, but any area closures to protect tribal values could be beneficial to wild horses and burros by limiting the possibility for human disturbance.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Any area closures to protect paleontological resources could be beneficial to wild horses and burros by limiting the possibility for human disturbance.

Effects from Visual Resources Management

Effects Common to All Alternatives

Management of visual resources would have little to no direct effect on wild horses and burros, but it could provide opportunities for education as to the place that these animals have in the landscape. The presence of wild horses and burros in the landscape reinforces the natural remote character of the land and the absence of human development and activity.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

Management of cave and karst resources would have little to no effect on wild horses and burros, but seasonal closures could benefit wild horses and burros by limiting the possibility for human disturbance.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Because Alternative C, Option 2 eliminates livestock grazing, the impacts from grazing are common to all alternatives except C. Not allowing wild horses and burros to mix with their domestic counterparts could indirectly contribute to the health of wild herds by reducing the spread of disease and competition for forage and water. Monitoring the range conditions could be beneficial to wild horses and burros if it were to result in healthier rangeland vegetative communities and increased forage opportunities. Range improvements, such as water developments, if maintained and functional, would directly benefit wild horses and burros by providing additional water sources, while some improvements, such as fencing, would have negative effects by excluding forage and

limiting the free-roaming nature of wild horses and burros. Forage adjustments could reduce AMLs, which could be detrimental to wild horse and burro herds, which need minimum numbers to maintain genetic diversity. Protecting existing or developing new water sources would be beneficial to wild horses and burros by ensuring availability of water as long as the sources were accessible. Generally, any increase in livestock grazing in areas inhabited by wild horses and burros would decrease the amount of forage and water available to wild horses and burros. Livestock management would increase the opportunity for disturbance. Fencing to control livestock would directly impair the free-ranging nature of wild horses and burros.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Alternative B specifically mentions using fencing for range improvements, which would directly impede the free-ranging nature of wild horses and burros. Competition between wild horses and burros and livestock for forage and water would increase under the following situations:

- Allowing livestock grazing on acquired lands;
- Not specifying criteria for TNR;
- Allowing continuous season-long grazing;
- Not retiring grazing permits; and
- Providing water for wildlife only when livestock are present.

Implementing appropriate management actions primarily for wild horses and burros over livestock and under conditions where allotment-specific objectives and the SRH are not being met would reduce AMLs for wild horses and burros.

Removing the Nightingale and Shawave Mountain HMAs and slightly expanding the Snowstorm Mountain HMA would decrease HMAs by approximately 190,630 acres. Reducing the acreage of HMAs that overlap with the Bluewing Seven Trough Allotment increases competition between livestock and wild horses and burros for forage and water. The increase in the Bullhead Allotment acreage could increase competition between livestock and wild horses.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Option 1

Managing grazing to be complementary and secondary to other resources (such as wild horses and burros) and closing acquired lands to grazing would benefit wild horses and burros by reducing competition from domestic livestock. Proper grazing management practices, such as adjusting grazing based on monitoring data and performing range improvements, would be beneficial because it could result in better range conditions and healthier plant communities with fewer invasive species

if the adjustments were in favor of AMLs rather than AUMs. Any fencing associated with livestock management would impact the free-ranging nature of wild horses and burros. Providing water for wildlife and wild horses and burros from June 1 to September 30, even if livestock have been removed, is more beneficial to wild horses and burros than only providing water for wildlife when livestock are present. Implementing appropriate management actions primarily for livestock under conditions where allotment-specific objectives and the SRH are not being met would benefit wild horses and burros by not reducing AMLs as much as it would reduce AUMs.

Option 2

Eliminating livestock grazing would directly benefit wild horses and burros by eliminating competition with domestic livestock for forage and water and would reduce the possibility of the negative effects of overgrazing. Limiting range improvements could limit the range health and forage and spatial distribution of wild horses and burros.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Other than Alternative C Option 2, which has no livestock grazing, Alternative D would have the fewest acres open to livestock grazing—8,016,754—which would be beneficial to wild horses and burros by eliminating some of the competition for available forage and water. Providing water for wildlife and wild horses and burros from June 1 to September 30, even if livestock have been removed, is more beneficial to wild horses and burros than only providing water for wildlife when livestock are present. Implementing appropriate management actions for livestock and WHB would be based on the specific class of use that is determined to be the causal factor. This could beneficially impact wild horses and burros by reducing livestock AUMs or negatively impact wild horses and burros by reducing wild horse and burro AMLs.

Effects from Minerals Management

Effects Common to All Alternatives

Mineral extraction could temporarily or permanently remove rangeland and forage areas for wild horses and burros, depending on the location of the mineral extraction. Activities associated with exploration and extraction could disrupt herd dynamics and open the potential for humans to disturb herds. Loss of rangeland and forage could be mitigated by post-mining reclamation. Roads associated with mineral extraction would remove rangeland until or if they were reclaimed and would increase opportunities for humans to disturb herds. Withdrawal or closure of areas for mineral development would reduce the potential for human-herd interaction and rangeland and forage loss. Protection of wild horse and burro resources through mitigation measures, SOPs (Appendix B), and BMPs (Appendix B) would be beneficial to wild horses and burros by preserving and restoring range health.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Salable Minerals

Alternative B which would apply existing guidance and standards for reclamation and closure only to operators of sites where there is no reasonable prospect for continued economic use would be least beneficial to wild horses and burros by possibly reducing forage opportunities for a longer period.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

General

Alternative C ,which would require site reclamation for leasable, locatable, and salable minerals to be as close to original topography and vegetation as possible, using native vegetation and organic fertilizers, regardless of economics, would be most beneficial to wild horses and burros in the long-term by providing more forage opportunities and a healthier range.

Salable

Mineral Operations would only be open to governmental entities under Alternative C and would require rehabilitation or reclamation of mineral operations. These include recontouring, stabilizing, revegetating, and removing facilities before closure to restore pre-operational topography and establish a historically native vegetation community to the maximum extent possible. This would be most beneficial to wild horses and burros in the long-term by providing a more natural range and forage.

Fluid

Requiring closure of lands in HMAs under Alternative C, would be most beneficial to wild horses and burros by limiting human commercial activity and herd and range disruption in HMAs.

Solid

Alternative C would keep over three times as many acres closed to leasing. This would benefit wild horses and burros by limiting the amount of range that could be disturbed and limiting the possibility of human disturbance.

Locatable

Alternative C would close the most acreage to locatable minerals. Lands acquired (by any process) would be withdrawn from mineral entry. This would provide the most benefit to wild horses and burros by limiting the amount of range that could be disturbed and limiting the possibility of human disturbance.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Encouraging visitors to use designated roads and trails, specifying concentrated use areas, and limiting OHV activity could benefit wild horses and burros by reducing the possibility of human disturbance or harassment and helping to preserve range forage. Limiting some activities, such as camping within 300 feet of springs and seasonally appropriate uses, would be beneficial to wild horses and burros by preserving water sources and reducing the chances for human disturbance.

Individual Effects under Alternative A

Alternative A would be least beneficial to wild horses and burros by not increasing public awareness of the ethics of responsible land and resource use. Moreover, Alternative A does not provide public outreach or educational programs nor monitor impacts on wild horses and burros from recreation activities or implement mitigation measures based on monitoring results. Alternative A would be least beneficial to wild horses and burros by closing or limiting OHV use on fewer acres, which would increase the possibility of harassment.

Individual Effects under Alternative B

Limiting OHV travel as proposed under Alternative B would offer greater protection of wild horses and burros from potential harassment. Restricting some uses and organized OHV activities in the Nightingale and Granite Range SRMAs could be beneficial to wild horses and burros by reducing the chances for human harassment. However, increasing the number of people allowed to use the areas would increase the potential for disturbance of wild horses and burros. It could be difficult to enforce controls outside of organized activities.

Individual Effects under Alternative C

Alternative C would be most beneficial to wild horses and burros by closing or limiting OHV use on more acres, which would limit the possibility of disturbance and range degradation.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Exclusion zones, land use restrictions, and individual stipulations could be beneficial to wild horses and burros by limiting range disturbance and limiting the potential for humans to disturb the herds.

Individual Effects under Alternative A

Alternative A would benefit wild horses and burros the least by not requiring reduced impacts on forage and from human-herd interactions through development of lease stipulations and mitigations and not having provisions for avoidance areas.

Individual Effects under Alternative B

Alternative B would be less beneficial than Alternatives C and D to wild horses and burros because it does not specify any exclusion zones that could lessen the chances for humans to disturb wild horses and burros.

Individual Effects under Alternative C

Alternative C would benefit wild horses and burros the most by requiring reduced impacts on forage and from human-herd interactions through development of lease stipulations and mitigations.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Any road decommissioning or closure would benefit wild horses and burros by limiting human access and allowing for revegetation-especially critical to riparian areas. Actions to limit erosion and the spread of weeds would be beneficial to wild horses and burros by improving the general health of the rangeland in the long term. However, if wild horse and burros were the cause of erosion, excluding them from accessing the areas during rehabilitation may take away forage in the short-term. New roads would remove range forage and increase the possibility of human disturbance.

Individual Effects under Alternative A

Alternative A, with no provisions to relocate and rehabilitate roads that create habitat fragmentation or that adversely impact wildlife and having no designated avoidance areas, would be least beneficial to wild horses and burros by not improving rangeland conditions or preserving free-roaming conditions.

Individual Effects under Alternative B

Alternative B would allow road decommissioning only if there were other access, which would negate the beneficial effects of closures that would have lessened the chances for humans to disturb wild horses and burros.

Individual Effects under Alternative C

Alternative C would be most beneficial to wild horses and burros by having provisions to relocate and rehabilitate roads that create habitat fragmentation, thereby increasing forage for wild horses and burros.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Maintaining BLM ownership or control of lands would be beneficial to wild horses and burros because the agency could exercise management practices to maintain rangeland and herd health and control habitat and range fragmentation by rights-of-way that would not be possible if the lands were in private ownership. Land disposal could directly impact wild horses and burros by reducing the available areas they could inhabit. Land disposal could increase the possibility of development and increased human activity near HMAs.

Individual Effects under Alternative A

Alternative A would be least beneficial to wild horses and burros because it has no provision for acquiring conservation easements, which could limit development, and surface occupancy, which would reduce the possibility of disturbance from people and vehicles. Alternative A designates the most HMA land for disposal, 289,203 acres, and the most acres of HA for disposal, 976,143. This would impact wild horse and burros as identified in Effects Common to All Alternatives, above.

Individual Effects under Alternative B

Alternative B designates the second most HMA land for disposal, 85,023acres, and the second most acres of HA for disposal, 712,880. This would impact wild horse and burros as identified in Effects Common to All Alternatives, above.

Individual Effects under Alternative C

Alternative C would be most beneficial to wild horses and burros because they specify that there would be no net loss and possibly a net gain of public lands within the WDO. This would preserve or increase the range available to wild horses and burros. Alternative C designates the fewest acres of HMA land for disposal, 29,644 acres, and fewest acres of HA land for disposal, 245,237. This would impact wild horse and burros as identified in Effects Common to All Alternatives, above.

Individual Effects under Alternative D

Alternative D designates 41,994 acres of HMA land and 276,076 acres of HA land for disposal. This would impact wild horse and burros as identified in Effects Common to All Alternatives, above.

Effects from ACEC and RNA Management (A Special Designation Area)

Effects Common to All Alternatives

ACEC and RNA management would generally have little effect on wild horses and burros.

Effects from Backcountry Byways Management (A Special Designation Area)

Effects Common to All Alternatives

New backcountry byways could increase the potential for humans to disturb wild horses and burros, however, they could also provide an opportunity to educate the public on the role of free-roaming wild horses and burros in the landscape.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

Alternative B, encouraging development of backcountry byways without considering existing resources could increase the opportunity for humans to disturb wild horses and burros if the developed byway was in an area critical to the herds.

Individual Effects under Alternative C

Specifying that backcountry byways would be developed only if existing resources were protected would benefit wild horses and burros by slightly reducing the chance of human disturbance.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from National Trails Management (A Special Designation Area)

Effects Common to All Alternatives

Development of new trails or increased use of existing trails could increase the chance for humans to disturb wild horses and burros.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Individual Effects under Alternative C

Alternatives C and D would be more protective of wild horses and burros by restricting or closing segments of national historic trails to OHV use and limiting fluid and solid mineral surface occupancy in the same areas. These measures would reduce the possibility for humans to disturb the wild herds.

Individual Effects under Alternative D

Alternatives C and D would be more protective of wild horses and burros by restricting or closing some segments of national historic trails to OHV use and limiting fluid and solid mineral surface occupancy in the same areas. These measures would reduce the possibility for humans to disturb the wild herds.

Effects from Wild and Scenic Rivers Management (A Special Designation Area)

Effects Common to All Alternatives

There are no effects common to all alternatives from wild and scenic river management..

Individual Effects under Alternative A

No eligible water segments would be brought forward under the Wild and Scenic River Act, so no impacts on wild horses and burros would occur.

Individual Effects under Alternative B

No eligible water segments would be brought forward under the Wild and Scenic River Act, so no impacts on wild horses and burros would occur.

Individual Effects under Alternative C

Any actions with positive impacts on riparian areas could be generally beneficial to wild horses and burros by preserving water sources and forage opportunities.

Individual Effects under Alternative D

No eligible water segments would be brought forward under the Wild and Scenic River Act, so no impacts on wild horses and burros would occur.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Land use restrictions and wilderness preservation could be beneficial to wild horses and burros by preserving the natural forage vegetation and limiting the possibility of human disturbance from motorized travel. Excluding motorized vehicles and providing fewer travel ways would be beneficial to wild horses and burros. However, the wilderness land use designation could promote additional visitor use and increase the potential for disturbance.

Individual Effects under Alternative A

See Effects Common to All Alternatives, above.

Individual Effects under Alternative B

See Effects Common to All Alternatives, above.

Individual Effects under Alternative C

See Effects Common to All Alternatives, above.

All of the areas designated as having wilderness characteristics under Alternative C are within HMAs. Designation of areas with wilderness characteristics could be beneficial in that it would

preclude some mineral activities but could attract additional visitors who would come to enjoy the wilderness characteristics. This could lead to an indirect effect by disturbing the wild herds.

Individual Effects under Alternative D

See Effects Common to All Alternatives, above.

Effects from Watchable Wildlife Viewing Sites Management (A special Designation Area)

Effects Common to All Alternatives

It is unlikely that there would be many effects to wild horses and burros from management of viewing sites. These sites could promote public awareness and education on the role of wild horses and burros as living symbols of the west.

Individual Effects under Alternative A

See Effects Common to All Alternatives above.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Individual Effects under Alternative C

Alternative C would avoid new routes through or near sensitive areas and would avoid increasing traffic in remote areas. This would be most beneficial to wild horses and burros by limiting disturbance from people and vehicles.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Public health and safety management would have little or no effect on wild horses and burros. However, any increased law enforcement could decrease harassment cases, and cleaning up illegal dumpsites would provide a safer environment and the opportunity for increased forage for wild horses and burros.

Effects from Sustainable Development Management

Effects Common to All Alternatives

The lands under consideration for sustainable development already have activities that may or may not impact wild horses and burros. Because of this, continued use of these lands would generally not have much additional impact, unless the future uses attracted additional people or OHV use or similar activities that could increase the chance of harassment or disturbance to herds or degrade rangeland conditions. All areas would eventually be reclaimed if there were no new reuse demand. Impacts on resources would last longer at a sustainable development site, however, new operations

would not be creating new disturbance, which would reduce impacts outside of the sustainable development site.

Individual Effects under Alternative A

Alternative A would be least protective of wild horse and burro habitat because it contains no criteria for disposal of public lands.

Individual Effects under Alternative B

See Effects Common to All Alternatives above.

Individual Effects under Alternative C

See Effects Common to All Alternatives above.

Calling for disposal only if existing resources would not be damaged and calling for no net loss of public lands would be protective of wild horses and burros by helping to ensure they have adequate range and unimpeded movement.

Alternative C contains a provision for no net loss of public lands, which would be most beneficial to wild horses and burros by preserving range and forage areas.

Individual Effects under Alternative D

See Effects Common to All Alternatives above.

Cumulative Effects

Cumulative impacts on wild horses and burros are similar to the Effects Common to All Alternatives, above. Wild horses and burros would directly benefit from actions to increase range areas and forage opportunities, to reduce competition from domestic livestock, to prevent mixing of wild and domestic horses and burros, to improve range conditions, to maintain or improve water sources, to eliminate barriers to movement and indirectly benefit from restricts on OHV travel or other potentials for disturbance from people, vehicles, and industrial activity.

Managing and adjusting herd numbers based on monitoring and range carrying capacity would benefit wild horses and burros by preventing overpopulation, which could lead to overgrazing and range deterioration, which in turn could lead to impaired herd health.

4.2.12 Wildland Fire Management

Summary

Protecting priority wildlife habitats, priority watersheds, cultural resources, commercial, mineral development, and recreation infrastructure would affect fire suppression priorities by increasing demands for fire suppression resources and fuel treatments. Conflicts could result as available firefighting resources become overextended. This could increase the costs of firefighting, if additional resources are needed. Overextended firefighting resources could also affect availability of firefighting resources locally, regionally, or nationally if they were diverted from other suppression efforts to the WDO. A similar trend is occurring nationwide. Because Alternative C generally has the

most areas with priorities for protection, it has the greatest potential to increase demands and costs for fire suppression resources and fuel treatments.

Alternative A provides the most access for fire suppression through travel management, but the access provided by the number of acres designated as open to OHV travel would also have the highest risk for human-caused fire, compared to other alternatives. This alternative would have the fewest fire suppression priority areas. Mineral and energy development would likely increase the number of facilities needing fire suppression.

Alternative B has the greatest potential to increase the Wildland Urban Interface areas (WUI) as more public acres would be available for land disposal. The risk of human-caused fire would be lower due to fewer acres designated open to OHV travel compared with Alternative A. Alternative B has more open acres than Alternatives C and D. Alternative B has the most potential for increased commercial and mineral development infrastructure that would require fire suppression protection.

Alternative C would close or restrict the most areas to OHV travel, which would result in lowering the potential for human caused fires and reduce a major source of weed spread. Option 2, would eliminate grazing and both options would eliminate chemical and prescribed fire treatments for weeds and to reduce fuels. Potential for fine fuel buildup would occur because of the lack of chemical weed treatment or prescribed fire, which could result in increased size and intensity of fires. This alternative has the largest number of priority protection areas which would increase fire suppression complexity to prioritize fires.

Alternative D encourages recreation more than Alternatives A and C but has fewer acres designated open for OHV travel. Additional priority protection areas would increase priorities for fire suppression, causing prioritization conflicts. ES&R actions to restore vegetation conditions, and prevent or eliminate the spread of noxious weeds, invasive plants, and to rehabilitate burned areas would all improve FRCC in the long run. These actions would also support the return of natural fire regimes, along with reducing the risks from wildland fire to the public and other resources.

Large Fire Suppression Costs

Instruction Memorandum 2006-204 directs the BLM to conduct a relative comparison on the effects plans would have on the cost of suppressing large wildland fires. The memorandum identifies activities that may affect the cost of fire suppression:

- Establishment of vegetation management objectives or treatments that leave land or resources at greater risk of damage from wildfire and therefore increase fire size and suppression costs;
- Restrictions on the application of allowing fire for resource benefit;
- Restrictions on suppression activities to meet other resource objectives;
- Actions that promote the expansion of invasive plants that alter fire regimes; or
- Actions that may limit suppression access, such as road decommissioning to meet other resource objectives.

Additionally, the WDO has identified the need to protect commercial or recreational development, resources, or special areas as a factor that would increase the need for fire suppression.

Under all alternatives, large wildland fire suppression costs are expected to increase due to increasing operating costs (fuel, personnel, equipment, and supplies), additional development outside the control of BLM managers, and increasing populations. The following assessment of the impacts of the RMP actions that differ between alternatives, using Alternative A as the base line. The effects are described in more detail in the effects sections below.

Alternative A

Alternative A would cause the second least increase in the cost of large wildland fire suppression. This alternative has a mix of beneficial and adverse effects for fire suppression costs. It has few restrictions but also has few tools.

Alternative B

Alternative B would have the least increase in the cost of large wildland fire suppression. Generally, it has the fewest restrictions on vegetation management, fire suppression, and access than other alternatives. It does allow for more development that would increase fire suppression priorities.

Alternative C

Alternative C would increase the cost of large wildland fire suppression the most. While it restricts many of the activities that cause a spread of weeds (particularly Option 2) or development that needs protection, it also limits the tools available to reduce fuel, control weeds, and suppress fires. It increases fire suppression on the most areas.

Alternative D

Alternative D would have the second most increase in the cost of large wildland fire suppression. It restricts vegetation management actions somewhat, has protection for wildlife habitat and watersheds, and allows development that would increase suppression priorities. The cost increase would be lower than under Alternative C because more fire suppression and fuel reductions tools can be used.

Methods of Analysis

Methods and Assumptions

This analysis is based on the following methods and assumptions:

- Fuel reduction treatments and emergency stabilization and rehabilitation (ES&R) will be effective;
- VRM I and II would restrict the location or the number of fuel treatments;
- Fire suppression is an emergency action and some requirements for ground- and surface disturbing activities do not apply to fire suppression;
- Population growth and development of SRMAs will cause an increase in use; and

- Mineral and energy development will increase access and facilities that require protection.

Effects from Air Quality Management

Effects Common to All Alternatives

Modeling and managing prescribed burning may limit the amount of prescribed burning in a given year or the number of acres treated.

Implementing strategically placed fuel treatments to reduce fire size and smoke emissions (if effective) would reduce acres burned by wildland fire in the long term and make fire suppression efforts more effective.

Individual Effects under Alternative A

Complying with air quality regulations, BLM policies, and prescription plans would affect wildland fire through smoke management. Prescribed fire activities could be shut down, delayed, or altered based on coordination with state and other agencies and other smoke management issues. The amount of acres treated with prescribed fire may also be reduced. Constructing fuel breaks, if effectively implemented, would cause some fires to be more easily suppressed, to burn at lower fire intensity, or be smaller.

Individual Effects under Alternative B

Actions to model smoke from prescribed burns and fire use and to reduce emissions from wildland fires by implementing strategically placed fuel treatments could delay implementation of some activities. This is to ensure air quality is maintained by coordinating air quality effects with other activities and agencies. However, it is unlikely that the delays would interfere with the overall goals of these activities.

Individual Effects under Alternative C

Effects on wildland fire management from air quality management actions under Alternative C are the same as those described under Alternative B.

Individual Effects under Alternative D

Effects on wildland fire management from air quality management actions under Alternative D are the same as those described under Alternative B.

Effects from Geology Management

Effects Common to All Alternatives

There are no impacts on fire management identified.

Effects from Soil Resources Management

Effects Common to All Alternatives

There are no effects common to all alternatives from soil resource management.

Individual Effects under Alternative A

Soil management would include implementing BMPs and SOPs (Appendix B) to reduce soil erosion for fire rehabilitation projects where they occur. Areas with easily erodible soils would be prioritized for emergency stabilization treatments.

More use of public lands could increase the potential for human caused fire, exposing more areas containing easily erodible soils and increasing ES&R costs to protect these soils from erosion.

Individual Effects under Alternative B

Increasing population growth combined with increased uses on public lands would increase the potential for human caused fires exposing more areas containing easily erodible soils. The resulting impacts would include increasing ES&R treatments and associated costs to protect these soils from erosion.

Individual Effects under Alternative C

Travel restrictions on OHV use would reduce the potential for human caused fires. Fewer areas containing erodible soils would be burned and demands for ES&R to protect these soils would be less.

Individual Effects under Alternative D

Effects on wildland fire management are similar to those under Alternative A.

Effects from Water Resources Management

Effects Common to All Alternatives

Applying land health standards would have the same effect as that described under vegetation.

Water resources management could restrict suppression operations by limiting use of heavy equipment or retardant near streams or riparian areas.

Individual Effects under Alternative A

Acquiring or providing sufficient water quantity and quality on public lands would improve wildland fire suppression by providing additional water sources.

Individual Effects under Alternative B

Effects would be similar to Alternative A.

Individual Effects under Alternative C

Designating and managing priority watersheds for incompatible activities would limit fire management actions and fuel reduction treatments if these actions conflict with the reason the watershed was designated. Acquiring more public land could increase water sources previously not available for fire suppression. This could also increase demand for fuel treatments and ES&R as more public lands would be administered by BLM.

Designating priority watersheds would increase fire suppression priorities to protect these areas.

Gaining access to water resources and developments through land acquisition would provide more accessible water for fire suppression actions.

Individual Effects under Alternative D

Effects are similar to those under Alternative C.

Land acquisition could improve access to water resources and developments through purchase of lands which would have wildland fire protection benefits.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

Monitoring forest health and establishing an early warning system for insect and disease would help meet desired future conditions for fire ecology by ensuring timely treatments to restore natural conditions and reduce fuels in areas negatively affected by forest health issues. Pest control treatments would reduce insect infestations and subsequently reduce dead fuel loadings.

Individual Effects under Alternative A

Effects include elevating the priority for suppression of fire in broadleaf woodland habitats and the Stillwater Range, which could increase the demand for fire suppression resources.

Protecting healthy woodlands would require fuel breaks to protect stands. Prescribed fire would promote woodland health and reduce the amount of dead fuel in areas, thus reducing fire intensity and severity.

Developing management actions to protect harvest areas from disease would, in the long term would reduce the amount of dead fuel in these areas. Management for allowing fire for resource benefit would not be implemented, consequently fuels buildup and decline stand health would occur.

Individual Effects under Alternative B

Effects would be similar to those described for Alternative A; however, allowing the use of wildland fire to restore stand health and structure, would allow changes to occur sooner and would increase the size of treated areas compared to using fuel reduction treatments.

In woodlands, reducing fuels would reduce fire severity and intensity, leading to more successful fire suppression when needed.

Allowing burned areas to be salvage harvested would reduce fuel loadings and may reduce fire size and intensity in the long term. Removing dead tress would improve public safety as well as firefighter safety, as falling dead trees are one of the most common causes of injury during fire suppression.

Individual Effects under Alternative C

In woodlands, achieving stand health and structure objectives would reduce fuels, which reduces fire severity and intensity, and would lead to more successful fire suppression when needed. Allowing natural fire regimes to return to the landscape would slow the reduction of FRCC in areas because prescribed fire, allowing fire for resource benefit, and chemical fuel treatments would not be used. Discontinued harvesting of pinyon pine could increase fuels, which could increase fire intensity and severity there. Recognizing stand encroachment as a natural process could increase pinyon/juniper, thereby increasing fuel loads.

Protecting old growth forests could increase the suppression priority for those areas.

Individual Effects under Alternative D

Effects are the same as those under Alternative A for restoring stand health and structure through prescribed fire.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

During fire suppression, the requirement to wash heavy equipment may limit the spread of weeds in areas where fire suppression operations occur. In the long term, limiting the spread of weeds would reduce fine fuels.

Weed and invasive species control would have a beneficial effect on fire rehabilitation because treatment success would improve, as it would result in less competition for native or seeded species after a fire.

Individual Effects under Alternative A

Eradicating, suppressing, controlling, preventing, or retarding the spread of any noxious weeds and annual invasive species would promote the success of fire rehabilitation projects by allowing seeded species to become established and to better compete with weeds or annual invasive species. Successful emergency stabilization and rehabilitation projects would help to restore historic fire regimes and to improve FRCC in the long term. Fire suppression operations are complicated as some invasive plants, such as cheatgrass, provide conditions that allow fire to burn through an area quickly and earlier in the season than do areas of native vegetation.

Individual Effects under Alternative B

Effects from weed management are similar to those under Alternative A; however, implementing a cost/benefit analysis would, in some cases, reduce costs and allow implementation of more effective methods to control weeds and invasive species for fire rehabilitation and fuel treatments.

Newer techniques and an additional focus on education and prevention of weed spread could make this alternative more effective, providing greater benefits to FRCC and natural fire regime.

Individual Effects under Alternative C

Many of the benefits described in Alternative B still would occur, though to a much lesser degree. Due to the limitations on using chemical treatments and prescribed fire, weed control, would be less effective causing a buildup of light fuels. Most weeds and invasive plants are difficult to control on a large scale without herbicides, so the benefit of improved FRCC and a return to a natural fire regime would be slowed considerably.

Restricting the use of chemicals to control noxious weeds would slow the success of fire rehabilitation projects because weeds would likely get established and spread, competing with seeded species.

Individual Effects under Alternative D

Effects are the same as those described for Alternative B.

Effects from—Chemical and Biological Control

Effects Common to All Alternatives

There are no effects common to all alternatives from chemical and biological control management.

Individual Effects under Alternative A

Use of chemicals and biological agents to control pests (weeds, invasive species, and harmful insect activity) would improve rangeland health, would allow for improved success of fire rehabilitation, would provide for long-term maintenance of fuel breaks, and would reduce fire intensity and spread.

Individual Effects under Alternative B

Effects are similar as those described in the weeds management section of Alternative A. Fuel breaks using chemical treatments would be less costly and more effective than biological controls.

Using biological controls for fuel breaks would be more costly, would require more monitoring, and would take longer to achieve resource objectives.

Individual Effects under Alternative C

Effects are the same as those described in the weeds management section of Alternative C. Not using chemical pesticides could allow for degrading stand health through more weeds, invasive plants, and harmful insects activity and could increase the amount of dead fuels. Fuel loadings could complicate suppression efforts and increase fire intensity and severity.

Individual Effects under Alternative D

Effects are the same as those described in the weeds management section of Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Achieving land health standards would, by definition, help to restore FRCC to more natural levels.

Achieving fire rehabilitation objectives would also help to restore FRCC. Implementing vegetation treatments to improve vegetation community health and protect vegetation communities may reduce fire intensity and severity by removing biomass. Seeding burned areas would help restore FRCC.

Restoring and improving degraded sagebrush habitats would improve FRCC by reducing cheatgrass.

Cheatgrass is the main reason that FRCC 3 is in most of the WDO and contributes to extreme fire behavior, severe fire effects, extensive burned areas, and a loss of the historic fire regime in sagebrush vegetation types.

Individual Effects under Alternative A

Managing for healthy and productive plant communities would improve FRCC and would restore and maintain the natural fire regime. In the short term, grazing reduces fine fuels, which would reduce fire spread, when controlled in manageable units with the proper infrastructure (water or fencing) to manage livestock use.

Fire rehabilitation would benefit rangelands when appropriate species are used and when vegetative cover is restored before weeds and invasive species become established. This would improve FRCC and would promote restoration of natural fire regimes. Resting areas from grazing after fire fires would help ensure appropriate vegetative establishment and would further the likelihood that weeds and invasive species would not become established.

Individual Effects under Alternative B

Effects described in Alternative A would occur in Alternative B. In addition, improving FRCC 3 to FRCC 2 on 70,000 acres would benefit rangelands by improving conditions and moving the area toward natural fire regimes. Eradicating cheatgrass, establishing desirable perennial species where possible, and rehabilitating degraded sagebrush habitats would improve FRCC 3. Reestablishing desired vegetation would help maintain the improved FRCC and would prevent or slow future establishment of noxious weeds and invasive plants that adversely affect FRCC.

Creating fuel breaks would benefit wildland fire suppression by providing a possible location for firefighters to safely extinguish a fire, resulting in fewer acres burned.

Allowing fire for resource benefits would improve the ecological health of vegetation communities and would provide long-term benefits by reducing fuels buildup and fire spread.

Prescriptive grazing is another tool to achieve resource objectives, reduce biomass, and modify fire behavior and spread. In the short term, grazing reduces fine fuels, which would reduce fire spread, when controlled in manageable units with the proper infrastructure (water or fencing) to manage livestock use.

Individual Effects under Alternative C

Option 1

Eliminating the use of chemicals and prescribed fire to achieve rangeland vegetation goals, particularly those related to cheatgrass, would slow beneficial effects or possibly would make them unachievable.

In the short term, grazing reduces fine fuels, which would reduce fire spread, when controlled in manageable units with the proper infrastructure (water or fencing) to manage livestock use.

Fire rehabilitation would be more costly as chemicals would not be used, which is particularly important in controlling the spread of weeds. ES&R costs would increase because seeding burned areas would require native seed, which is more costly and difficult to acquire in suitable amounts. ES&R short-term success would be less effective as native species take longer to establish. ES&R treatment success of seedings would be higher as rehab areas would be closed to livestock/WHB grazing following fire, for a period of 5 years. Also, management actions to improve approximately 80,000 acres from FRCC 3 to FRCC 2 are provided under this alternative. Availability and effectiveness of native seed would make fuel treatments (green strips) less effective and more expensive. Suppression priorities would increase under this alternative because healthy and recovering sagebrush stands would become suppression priorities.

Option 2

Effects are similar to those under Option 1. Eliminating grazing could reduce the spread of noxious weeds and invasive species, slightly offsetting the effects of not using chemical treatments. Eliminating prescriptive grazing would increase fine fuels in areas, promoting fast moving fire spread. Success of fire rehabilitation projects would increase as seedings would recover over the long term without grazing. Overall FRCCs would likely improve in areas that have been treated.

Individual Effects under Alternative D

Effects are the similar as those described for Alternative B. Although there would be no specified time frame for resting burned areas from grazing.

Allowing fire for resource benefits would improve the ecological health of vegetation communities and would provide long-term benefits by reducing fuels buildup and fire spread.

Allowing native and nonnative seed species in ES&R would enhance success and accelerate achievement of objectives, which would improve FRCC.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Implementing mitigation measures to reduce potential adverse impacts on wetlands and riparian areas may reduce the effectiveness of suppression tactics by restricting operation of heavy equipment and use of retardant in these areas.

Individual effects under all alternatives would be similar to those described for water resource management.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Applying land health standards would have the same effect as those described under rangeland management. Land health standards, standard operating procedures, and mitigation measures could

restrict the types of suppression actions and fire allowed for resource benefit within certain wildlife habitat types. These actions include limiting back fires in sagebrush habitats.

Individual Effects under Alternative A

Protecting crucial habitat areas requires fire suppression prioritization. Pre-disturbance inventories for nesting migratory birds and seasonal restrictions and mitigations could eliminate or change timing of prescribed fire and other fuel treatments.

Applying land health standards would help to restore FRCC to more natural levels. In some areas where fire occurrence or behavior is more frequent or more extreme due to poor habitat conditions, achieving land health standards would reduce fire risks, would reduce the amount and severity of wildland fire, and would improve suppression success. In areas with sensitive species habitat, emergency stabilization and fuel treatments using nonnative species seed may alter habitat. These impacts are minimal as ES&R and fuel treatment plans are developed to include species that are compatible with restoring, maintaining, or improving sensitive species habitat (see SOPs identified in Appendix B).

Individual Effects under Alternative B

The effects are similar to those described under Alternative A.

Developing mitigation measures to avoid active nests could eliminate, affect location, or change timing of prescribed fire treatments, reducing their effectiveness, increasing costs, or eliminating them altogether.

Using prescribed fire, allowing fire for resource benefit, and other treatments to restore, protect, and improve wildlife habitat would help to restore the historic fire regime and reduce fuels and FRCC where treatments occur.

Individual Effects under Alternative C

The effects are similar to those under Alternative A.

Use restrictions and mitigation measures would be implemented to protect 1,267,481 acres of Priority 1 wildlife habitat areas for sage-grouse and sagebrush obligates and 869,645 acres of Priority 2 habitat. This would prohibit the use of prescribed fire and chemicals to reduce fuels and improve FRCC. Rangeland would not be restored, maintained, or improved with nonnative grasses that encroach on sensitive habitat.

Removing access routes that adversely affect aquatic resources and riparian values could reduce access for fire suppression if alternative routes are not developed. The potential for access routes to be removed is greatest under Alternative C.

Suppression priorities would increase because this alternative has the largest number of acres of priority wildlife habitat areas. Seasonal wildlife closures could impact the timing and location of when and where fuel treatments are implemented.

Individual Effects under Alternative D

The effects are similar to those described under Alternative A.

Use restrictions and mitigation measures implemented to protect 699,929 acres of Priority 1 wildlife habitat areas for sage-grouse and sagebrush obligates and 1,325,967 acres of Priority 2 wildlife acres could restrict fuel treatment locations and timing. Protecting designated Priority 1 and 2 wildlife habitat areas would increase the priority for wildland fire suppression, although not quite as much as under Alternative C due to slightly fewer acres included in the priority habitat designation.

Using prescribed fire for resource benefit and other vegetation manipulation treatments to restore, protect, and improve wildlife habitat would help to restore the historic fire regime, reduce fuels, and help improve FRCC where treatments occur.

Effects from Special Status Species Management

Effects Common to All Alternatives

Protections for some special status species, such as protecting raptor nesting sites and ferruginous hawk nests, may limit the strategic placement of fuel treatments to reduce fire risk and protect habitat. Avoiding tree control around ferruginous hawk nests would prevent construction of fuel breaks or fuel reduction treatments where the nests occur.

Implementing standard operating procedures, mitigation measures, and conducting surveys or inventories before an activity to protect sensitive species habitat could affect the locations or timing of fuel treatments. However, these actions benefit sensitive species by protecting them against adverse impacts.

Individual Effects under Alternative A

Fuel treatments could be restricted in some instances based on results of the pre-disturbance inventories for sensitive wildlife species. Implementing mitigation measures to protect sensitive species, would also limit the size, location, and timing of fuel treatments, making them less effective and more expensive or eliminating them altogether.

Individual Effects under Alternative B

This alternative has no Priority 1 wildlife habitat so fire suppression priorities would cover fewer acres as compared to Alternatives C and D.

Individual Effects under Alternative C

Fire suppression priorities would increase as priority wildlife and watershed areas would be elevated as priority suppression areas. The guidelines for sage-grouse protection are the most restrictive and cover the widest area compared to the other alternatives. Under Alternative C, fuel treatments to protect SSS habitat would be restricted as prescribed fire and chemical treatments would not be utilized. There would be more areas subject to fuel treatment restrictions, such as size and location of treatments as there are more priority wildlife habitat areas and priority watershed areas under this alternative. However, there would be more opportunities to increase the number of strategically placed fuel treatments in order to protect priority wildlife and watershed areas.

Individual Effects under Alternative D

Impacts would be similar to Alternative C. However there would be fewer priority wildlife and watershed areas, which would reduce the number of fire suppression priority areas. This would also allow fewer restrictions for placement of fuel treatments.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Management of wild horses and burros includes removing or excluding horses and burros from rehabilitated areas, which would promote long-term success of fire rehabilitation treatments by reducing the grazing and trampling of newly established vegetation.

Individual Effects under Alternative A

Impacts are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative B

Impacts are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative C

Maintaining unobstructed landscapes by removing fences would improve access and fire suppression efficiencies. More temporary fencing may be needed for fire rehabilitation treatments as fewer fences on the landscape would be available to tie in fire rehabilitation fencing.

Individual Effects under Alternative D

Some fences would be removed, which would improve access for fire suppression.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Using a decision support process would focus efforts where needed most. The decision support process includes the fire management plan suppression objectives and strategies, Wildland Fire Situation Analysis (WFSA), and Wildland Fire Decision Support System (WFDSS). WFSA and WFDSS would also help ensure that wildland fire suppression did not cause undue harm to threatened resources, such as biological and cultural resources. Minimum impact suppression tactics would reduce unanticipated effects on other resources during fire suppression. Compliance with interagency standards and policy guidance, including WFSA and WFDSS, would focus suppression efforts on those that would be most effective and would provide for firefighter safety.

Continuing to update fire management strategies annually would ensure that fire management resources are used efficiently to meet fire management objectives within the WDO.

Reducing fuels in the WUI area would provide defensible space and locations where fires can safely be suppressed, would reduce the risks to public safety and property, would maintain firefighter safety, and could reduce fire suppression costs.

In the long term, use of fuel treatment tools would improve public safety, would reduce property losses, and would improve vegetative health. Additionally, natural fire regime would be maintained in some areas by protecting vegetation communities that are closer to historical species and density.

Allowing fire for resource benefit would play a role in reducing fuel loads and would require less suppression. Rehabilitating degraded rangeland could improve FRCC by promoting revegetation and soil stabilization. Seeding would deter the establishment and spread of cheatgrass, which would help to reestablish the natural fire regime and reduce fire severity in those areas.

Public education efforts and use of restrictions and closures when warranted would reduce the number of human-caused wildland fire. In the long-term, this could reduce the number of acres burned.

Individual Effects under Alternative A

Developing a response to wildland fires based on social, legal, and ecological consequences of the fire would help to prioritize wildland fire suppression actions. Following established plans and guidance would maintain wildland firefighter safety. Issuing fire restrictions would help to minimize human-caused fires.

Reducing hazardous fuels in WUI would make emergency response to wildland fires safer for firefighters and would reduce the risk to life and property, as would developing and implementing wildland fire protections plans and community assistance strategies. There are currently 212,350 acres of WUI in FRCC 3.

Rehabilitating degraded rangelands would benefit rangeland by improving land health. This would be done by improving FRCC from higher FRCC to lower FRCC.

Collaborating and promoting interagency cooperation would maximize the effectiveness of wildland fire management activities and results. Researching fire issues would provide information to improve suppression tactics and firefighter safety and would provide additional tools for reducing FRCC and restoring natural fire regimes.

Individual Effects under Alternative B

Effects are the same as those described for Alternative A, except 110,167 acres would be designated for allowing fire for resource benefits. This would slightly reduce the amount of fire suppression necessary, if wildland fire were burning in these areas within prescription. Allowing fire for resource benefit would improve stand health in appropriate areas, which would improve FRCC in the long term.

Individual Effects under Alternative C

The effects are the same as those described for Alternative A. No benefits would occur from allowing fire. More demand for fuel treatments would occur in lieu of allowing fire for resource benefit.

Individual Effects under Alternative D

Effects are the same as those described for Alternative B, but only 9,932 acres would be designated for allowing fire for resource benefit. Benefits from improvements in stand health due to allowing fire would be 90 percent less than under Alternative B.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Cultural resource management could affect suppression tactics by prioritizing protection of cultural resources over other resources. Heavy equipment may be prohibited in culturally sensitive areas. Mitigation measures to protect cultural resources from wildland fire may require more firefighter resources to install sprinkler systems, wrap buildings, or install fuel breaks.

Individual Effects under Alternative A

Protecting historic landscapes with VRM II would have the effects described under visual resources management, below.

Effects of maintaining and protecting pinyon and juniper are discussed under woodland forest and woodland products under Alternative A.

Suppression tactics could be altered to accommodate protection of cultural resources. Use of heavy equipment would be restricted in sensitive areas.

Implementation of fire rehabilitation treatments may be delayed until cultural resource inventories are completed. Fuel treatments could be restricted in culturally sensitive areas and within settings of the California historic trail.

Individual Effects under Alternative B

Effects of maintaining and protecting pinyon and juniper are discussed under woodland forest and woodland products under Alternative B. Areas for allowing fire for resource benefit in the Stillwater Range poses a risk to cultural resources that could increase fire prescription complexity and or destroy cultural resources.

Individual Effects under Alternative C

Protecting historic landscapes with VRM II would have the effects described in the visual resources management section, below. Alternative C would protect the most areas, when compared to other alternatives, so the effects from cultural resources management would be the greatest in this alternative.

Effects of maintaining and protecting pinyon and juniper and of thinning all woodland types are discussed under the woodland forest and woodland products section of Alternative C.

Developing a cultural resources sensitivity model would improve fire suppression by identifying sensitive areas to be avoided during suppression of wildland fires before suppression is needed.

Individual Effects under Alternative D

Effects of maintaining and protecting pinyon and juniper and thinning all woodland types are discussed in the woodland forest and woodland products section under Alternative B.

Effects from Tribal Consultation

Effects Common to All Alternatives

Tribal consultation would affect installation of fuel breaks as treatments may be restricted in areas that have Native American religious importance.

Individual Effects under Alternative A

Impacts would be the same as identified under Effects Common to All Alternatives.

Individual Effects under Alternative B

Using prescribed fire and allowing fire for resource benefit may be precluded in areas that have sensitive Native American religious values.

Individual Effects under Alternative C

Impacts are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative D

Impacts are the same as those identified under Alternative B, but, with fewer areas on the landscape available for allowing fire for resource benefit, fewer acres may be precluded due to Native American religious importance.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Management of paleontological resources would have little effect on fire management because the actions proposed do not affect fire suppression, use of fuel treatments or ES&R.

Effects from Visual Resources Management

Effects Common to All Alternatives

Managing to meet VRM classes and protect the visual integrity of national historic trail resources may elevate suppression operations priorities in VRM I and II and historic resource areas.

Individual Effects under Alternative A

VRM I and VRM II areas may limit fuel treatments, such as reducing fuels through cutting or chipping and ES&R treatments in some areas. Limitations would include blending disturbance lines or relocating projects to areas having fewer visual impacts.

Individual Effects under Alternative B

Effects of VRM classification on wildland fire would be similar to Alternative A. Alternative B has more acres of VRM II areas compared to Alternative A. Fuels and ES&R treatment restrictions would incrementally increase due to the amount of designated VRM II acreage.

Individual Effects under Alternative C

Effects of VRM classification on wildland fire are discussed in detail in Alternative A. Alternative C has more than four times as many acres in VRM I and II as under Alternative A. This alternative would have the greatest effects on fuels and ES&R with respect to location and appearance of treatments from visual resource management.

Individual Effects under Alternative D

Effects of VRM classification on wildland fire are discussed in Alternative A. Effects are similar to those under Alternative C, although Alternative D has about five percent fewer acres in VRM I and II.

Effects from Cave and Karst Resources Management

Effects Common to All Alternatives

Management of cave and karst resources would have minimal effects to fire management. Some infrastructure, such as interpretive signage or kiosks may elevate suppression priorities to protect these structures.

Effects from Livestock Grazing Management Common

Effects Common to All Alternatives

Managing allotments to meet land health standards would reduce fuel loads, fire intensity, and size in some areas. Achieving fire rehabilitation objectives would re-establish rangeland, providing long term benefits for grazing. Closing areas to livestock grazing that have been rehabilitated after a fire would help ensure the establishment of seeded vegetation and would improve rehabilitation success. These benefits would also improve FRCC in the long term.

Individual Effects under Alternative A

The effects of grazing management are the same as those for rangeland management. Initiating and managing grazing systems to meet land health standards would reduce fine fuels and deter invasive species, which would reduce fire intensity and spread. Closing burned areas to livestock grazing following a fire would help promote the fire rehabilitation success of seeded vegetation. Permittee (livestock operator) requests for fuel reduction treatments are expected to increase.

Individual Effects under Alternative B

The effects are the same as those under Alternative A. Management emphasis on installing range improvements to achieve resource objectives may hamper suppression operations through construction of fences. However, more water sources may be developed providing additional water for suppression operations.

Individual Effects under Alternative C

Option 1

The effects of grazing management are the same as those for rangeland management.

Option 2

Eliminating grazing would reduce the spread of cheatgrass in areas because cheatgrass is spread by grazing.

Individual Effects under Alternative D

Effects are the same as those under Alternative A.

Prescriptive livestock grazing could be used for fuel breaks, which would reduce fire intensity and spread.

Effects from Minerals Management

Effects Common to All Alternatives

Construction of mine infrastructure would increase suppression priorities to provide public safety and protect property. Reclaimed sites could serve as fuel breaks for fire suppression and protect resources. Active mines may also provide additional suppression resources (equipment) and water sources. Mines along with oil, gas, and geothermal development would improve access for fire suppression activities. Improved access may also increase the potential for human caused fires.

Individual Effects under Alternative A

Impacts are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative B

Effects described as common to all alternatives would occur. Improved access combined with increased potential for human caused fire would occur from more acres available for mineral development.

Individual Effects under Alternative C

Facilities constructed for mineral development would not be as extensive as other alternatives, so there would be fewer operations and associated infrastructure that need fire protection. Fewer access roads would be constructed for mining that could also be used for fire management access. The potential for human caused fire would be lower under Alternative C.

Individual Effects under Alternative D

This alternative has fewer acres open to mineral development than under Alternatives A and B.

Fewer facilities would need fire suppression protection.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Providing for dispersed recreation may increase the use of public lands and consequently the risk of human-caused fires. Recreation developments such as campgrounds would provide infrastructure and could increase public use and increase suppression priorities and demand for firefighting resources.

Individual Effects under Alternative A

Protecting recreation areas and associated infrastructure would elevate fire suppression priorities and demand for fire resources in these areas. Protecting SRMAs and infrastructure would increase the need for strategically placed fuel breaks.

Individual Effects under Alternative B

This alternative is more public use intensive and more emphasis would be placed on developing SRMAs. More demand for fire suppression resources would occur.

Facilities associated with future SRMAs and their management would require fire protection similar to the wildland urban interface.

Individual Effects under Alternative C

Fewer SRMAs would be designated under Alternative C, so fewer recreation facilities would require fire protection. Public land recreation use may be slightly less due to fewer SRMAs, reducing the potential for human-caused fires compared to other alternatives.

Individual Effects under Alternative D

Facilities associated with SRMAs and their management would require fire protection similar to Alternative B.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Impacts from renewable energy development are the same as those described under mineral development.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Maintaining roads necessary for fire suppression would ensure adequate access and reasonable emergency response times.

Individual Effects under Alternative A

Transportation and access management affects wildland fire in three main ways: 1) by providing access for fire suppression, 2) by providing an avenue for noxious weed and invasive plant spread,

and 3) by providing access for increased human activities, which can lead to human-caused fires. Roads and trails that are maintained, repaired, or open for public use generally remain in a passable condition that allows access for fire suppression equipment and manpower. This improved access results in faster response times leading to reduced fire size.

Roads and trails are one of the main vectors of weed spread, which leads to increased FRCC and ecosystems moving away from natural fire regimes. This is compounded by open OHV management areas, which spreads invaders into the surrounding areas. Additional open OHV use and increased human use increase the potential for human-caused fire ignition. Alternative A includes 6,782,790 acres of open, 416,652 acres of limited, and 24,832 acres of closed OHV designations. Alternative A has the most acres designated as open for OHV and therefore has the greatest potential risk for human-caused fire and weed spread.

Individual Effects under Alternative B

Effects from transportation and access management generally are similar to those described for Alternative A, but there are several important differences. Alternative B has fewer acres open to OHV use (1,453,655 acres) than Alternative A, so fewer acres would be at risk for adverse weed spread and human-caused fire effects. Alternative B would decommission only those roads that are damaging the environment if alternative access is available. This action would provide a higher level of road access for fire suppression than any of the other alternatives and would provide more opportunities for weed spread and human-caused fires.

Individual Effects under Alternative C

Effects are similar to those under Alternative A; except that Alternative C has no areas designated as open and therefore would have the least potential for human-caused fires due to off-road activities.

Individual Effects under Alternative D

Effects are similar to those under Alternative A, except that acres open to OHV are 289,932. Compared to Alternatives A and B, there would be less potential for human-caused fires. There would be more potential than Alternative C.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Ownership adjustments that improve manageability and ensure public access would increase fire management efficiency. Disposal of public lands to private ownership could create more wildland urban interface areas, adding to fire suppression and fuel treatment priorities.

Individual Effects under Alternative A

Land tenure adjustments changing public lands into private lands would expand WUI areas, and increase fire suppression and fuel treatment demands.

Individual Effects under Alternative B

This alternative proposes disposal of the highest number of acres of public lands. An incremental increase in WUI areas would occur over time. Demand for fire suppression resources and fuel treatments would increase.

Individual Effects under Alternative C

Public land disposal would not occur to the extent it would in other alternatives so the potential to increase the WUI would be decreased. Fire suppression demands in and around urban areas would not increase as much as other alternatives. Exclusion areas for discretionary realty actions would reduce the amount of infrastructure and reduce demands for suppression resources to protect property.

Individual Effects under Alternative D

Land tenure adjustments changing public land to private ownership would be greater than under Alternatives A and C. As a result, under Alternative D, WUI areas would increase more over time.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

There are no effects common to all alternatives from ACEC/RNA management.

Individual Effects under Alternative A

There would be no effect on fire management from special designations under this alternative.

Individual Effects under Alternatives B

Effects would be the same as Alternative A.

Individual Effects under Alternatives C

ACECs would become priority fire suppression areas under this alternative increasing the demand for fire resources and fuel treatments to protect ACEC values.

Individual Effects under Alternatives D

Effects would be the same as Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Management of backcountry byways would have little affect fire management. Strategically placed fuel treatments may be necessary to protect backcountry byways.

Effects from National Trails Management

Effects Common to All Alternatives

Management of national trails is similar to those described in the cultural resources section. Protecting the setting of National Historic Trails may restrict the number and locations of fuel treatments.

Effects from Wild and Scenic Rivers Management

Individual Effects under Alternative A and B

There would be no effects as there are no W&SR designated.

Individual Effects under Alternatives C

Management of wild and scenic rivers could restrict fire suppression operations through restricting retardant and use of heavy equipment.

Individual Effects under Alternative D

There would be no effects as there are no W&SR designated.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Suppression activities could be limited in WSAs based on possible restrictions on access and use of heavy equipment.

Individual Effects under Alternative A

Wilderness and WSA management may restrict suppression tactics by limiting or restricting the use of power equipment within the wilderness or WSA. Fire may become more intense and spread beyond the wilderness or WSA, causing more acres to burn.

Individual Effects under Alternative B

Effects are the same as those described under visual resources management.

Individual Effects under Alternative C

Wilderness and WSA management may restrict suppression tactics by limiting or restricting the use of power equipment within the wilderness, WSA, or the four areas identified with wilderness characteristics. Fire may become more intense and spread beyond the wilderness, WSA or the four areas identified with wilderness characteristics, causing more acres to burn.

Individual Effects under Alternative D

Effects are the same as those described for Alternative A.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

Protecting infrastructure that support wildlife viewing areas would have minimal impacts on fire suppression resources. Constructing strategically placed fuel treatments would protect these areas.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Providing for public safety would be a top suppression priority during fires.

Effects from Sustainable Development Management

Effects Common to All Alternatives

Reuse of existing infrastructure would extend the time that the facilities would need fire protection and would affect the location and increase demand for strategically placed fuel breaks. Maintaining access to the facilities would also provide access for fire suppression. Disposal of public lands to private ownership could restrict access for equipment or water supplies. These impacts would be offset based on acquisition of easements as appropriate.

Cumulative Effects

Present and reasonably foreseeable actions that would affect fire management are as follows:

- Increasing population growth;
- Increasing public use of public lands for recreation and commercial development;
- High potential for increasing mineral and renewable energy development;
- Climate change; and
- Wildland fire suppression and rehabilitation.

Effects Common to All Alternatives

There would be cumulative effects on fire management from future human-caused and naturally occurring wildland fire. Fire suppression priorities would be expected to increase because WUI areas would expand including development on adjacent lands and more commercial and public activities occur. Increasing population growth combined with growth of recreation, commercial, mineral and renewable energy development would increase the potential for human caused fires. At the same time access for fire suppression operations would improve. Demand for fire suppression resources, fuel treatments and ES&R would increase. Vegetation management (particularly fuel reduction) and ES&R on public, privately owned and other federal lands in and around the WDO would help to improve FRCC. Wildland fire burning within its natural fire regime that does not contribute to cheatgrass spread would also improve FRCC. Conversely, wildland fire burning outside historic conditions of more severe fire effects or burning in cheatgrass would contribute to increase FRCC in adjacent areas. Vegetation and its associated fire regime evolved throughout many varied climates. The analysis timeframe (20 years) for cumulative effects from the Winnemucca RMP is relatively short in terms of fire regimes and condition, so climate change would not affect FRCC noticeably.

Changes in FRCC from climate change would be far exceeded by land use impacts, such as expansion of invasive plants (or effective treatments), fire suppression, and human-caused fires.

Individual Effects under Alternative A

Increased use on BLM and adjacent lands combined with few OHV travel restrictions would increase the likelihood of human-caused fires. Development would increase the amount of WUI and the number of fires that are a priority for fire suppression.

Individual Effects under Alternative B

Emphasizes development and use public lands would likely lead to additional priority fire suppression to protect infrastructure. Alternative B adds to this prioritization by indirectly increasing the amount of recreational activity and mineral and energy development. Development could improve access for fire suppression on public and adjacent lands. Human caused fire would be expected to increase over time.

Individual Effects under Alternative C

Reducing potential commercial, mineral, and energy development on BLM lands would likely increase the pressure for these activities to occur on lands not administered by BLM. Fire suppression operations would increase due to increasing priority suppression areas (Wildlife, watershed priority areas, ACECs, W&SR) to protect natural resource and additional fuel buildup caused by elimination of chemical treatments and prescribed fire to treat fuels for fuel breaks would occur. Because of this, fires on BLM lands would be more difficult to suppress, and this would likely result in additional acres burned in the long term. Commercial, mineral, and renewable energy development would reflect slow growth and fire suppression priorities to protect infrastructure would be lower compared to other alternatives. Rehabilitation of lands would increase as the potential for larger fires would increase. Potential for human caused fire would be lower under Alternative C because commercial, mineral development, recreation, and renewable energy development would occur slowly. Travel restrictions for OHV use would also reduce potential for human caused fire.

Individual Effects under Alternative D

Increase population and development would increase the potential for human caused fires over time. Travel restrictions to limit OHV use would reduce this potential in areas. Commercial, mineral, and renewable energy development would have impacts similar to those described under Alternatives A and B. Wildland fire suppression demands, fuel treatments, and ES&R would increase in order to protect WUI, priority wildlife and watershed areas and ACECs.

4.2.13 Cultural Resources

Summary

The cultural resources of the WDO include a variety of resource types, including prehistoric and historic archaeological sites and structures, National Historic Trail segments, culturally modified trees, and places that are associated with traditional cultural and religious practices. Proposed management actions that could impact or increase the risk of impacts on known and unknown

cultural resources include those that require ground disturbance, that affect natural processes, such as erosion, that expose vulnerable cultural resources to intense fire, that open or close land to potentially incompatible uses, that affect the visual, atmospheric, or aural setting of some cultural resources, traditional cultural properties, sacred sites and National Historic Trails, that affect access to cultural resources, and that remove or add land subject to federal protections for cultural resources.

Most of the WDO has not been inventoried for cultural resources, and thousands of undiscovered or unrecorded resources are believed to be there. A Section 106 process and tribal consultation would be completed to address anticipated impacts resulting from authorized and planned activities; however, unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism could lead to impacts that may be more difficult to monitor and mitigate. Management actions include stipulations designed to avoid or reduce impacts. Impacts on TCPs, sacred sites, historic trails, and some other cultural resource sites which are significant for reasons other than data potential may be difficult or impossible to mitigate.

Because planned actions would be subject to review as federal undertakings under the Section 106 process, there would be further site-specific consideration and mitigation of cultural resource impacts for many of the actions. Overall, the emphasis in Alternative C on actions that emphasize resource conservation and protection and that restrict incompatible actions would best protect significant cultural resources, followed by Alternative D. Alternative B provides the least protection for cultural resources, and Alternative A represents the status quo.

Methods of Analysis

Indicators

Indicators are used to identify the level or risk of impact. The primary indicator for assessing the condition and trend of cultural resources is the effect on cultural resources that are eligible for listing on the National Register of Historic Places, National Historic Trails or areas of importance to Native Americans or other traditional communities. Other impact indicators include the following:

- Acres and relative depth of ground-disturbing activities or removal of structural features permitted and their potential for affecting known or unknown intact cultural resources or areas of importance to Native American or other traditional communities;
- Increased access to or activity in areas where resources are present or anticipated;
- Extent that an action changes the potential for erosion or other natural process that could affect cultural resources;
- Extent that the action alters the visual, aural, or atmospheric setting of cultural resources, TCPs, and National Historic Trails; and
- Acres of land that would be removed from federal cultural resource protections or loss of federal stewardship of lands, including the National Historic Trail and trail setting.

Methods and Assumptions

Impacts on cultural resources are assessed by applying the "criteria of adverse effect," as defined in 36 CFR 800.5a: "An adverse effect is found when an action may alter the characteristics of a historic

property that qualify it for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed in distance, or be cumulative." The criteria of adverse effect provide a general framework for identifying and determining the context and intensity of potential impacts on other categories of cultural resources as well, if these are present. An assessment of effects involving Native American or other traditional community, cultural, or religious practices or resources also requires focused consultation with the affected group.

In this analysis, the criteria of adverse effect are applied on a broad scale to all known or anticipated cultural resources or cultural resource types. Analysis is based on knowledge of the resource base of the project area and the level of impacts (or risk of impacts) on cultural resources associated with the plan objective or management action. In most instances, effects are assessed qualitatively using the best professional judgment of the preparers and BLM cultural resource specialists.

Many of the actions proposed would be federal undertakings subject to further site- and project-specific Section 106 review, effects analyses, and mitigation development designed to minimize any adverse effects. This analysis focuses on defining those impacts which may result from actions or planning direction that may not be mitigated through further Section 106 review or other review and on those management measures that would reduce or increase the risk of impacts on cultural resources.

The following assumptions regarding the resource base and management practices were considered in the analysis:

- Most of the WDO has not been inventoried for cultural resources, but over 6,000 archaeological sites alone have been documented. There is potential for many more cultural resources in uninventoried areas, but the presence and significance of resources cannot be confirmed or quantified;
- TCPs are places associated with the cultural practices or beliefs of a living community. These cultural resource sites are rooted in the community's history and are important in maintaining cultural identity. Contemporary Native American groups maintain social and cultural ties to the land and resources of the WDO. These cultural resources are generally not known or discussed outside of those communities, but they are present in the WDO. There may be places within the WDO that are important to other contemporary communities, such as those associated with ranching or sheepherding traditions and lifeways. Maintaining access to and reducing impacts on these places is a responsibility of the BLM;
- The BLM has prepared a quantitative sensitivity model for prehistoric cultural resources on private and public lands in the WDO. The model estimates the densities and types of prehistoric cultural resources on lands that have not yet been inventoried. The model has not yet been field tested and is incomplete, but it is used where appropriate to analyze and compare alternatives. The model cannot predict the location of sites and is not a substitute for an archaeological survey. This model also includes an appendix on historic transportation routes that was used to assess historic-period resources;
- For prehistoric sites overall, predicted densities range from 2.2 sites per square kilometer (5.8 per square mile) in the low sensitivity rank, to 34.2 sites per square kilometer (88.7 sites per

square mile) in the very high rank. Of the lands modeled, 40.9 percent were considered of moderate sensitivity rank (3.0 sites per square kilometer, 5.8 per square mile). High sensitivity was predicted for 28.5 percent of the lands (7.6 sites per square kilometer, 19.6 per square mile). Low sensitivity was predicted for 27.9 percent of the lands, and 2.5 percent were assigned the very high sensitivity rank;

- In the absence of inventory information, the number of acres affected and the intensity of the proposed activity is assumed to broadly correlate to the potential number of cultural resource sites that may be affected and the potential severity of the impacts. There is also qualitative information that indicates areas where there is a higher probability that cultural resources would be present, relative to the whole WDO. For example, highly disturbed or recently developed areas are less likely to include intact cultural resources;
- The importance of a cultural property often depends on the physical, chemical, functional and aesthetic characteristics of the property. Natural weathering, decay, vandalism and construction can remove elements that originally were part of a cultural property. This loss affects the completeness and accuracy of the information used by scientists and recreation interpreters and influences the importance of the property for traditional uses;
- Activities such as human visitation, recreation, vehicle use, grazing, and fire and nonfire vegetation treatments increase the rate of deterioration through natural processes. While the effect of a few incidents may be negligible, the effect of repeated uses or visits over time could increase the intensity of impacts due to natural processes;
- Effective scientific use of a cultural property depends on the vertical and horizontal relationships among the elements of the property and the context of the property itself. Even partial displacement of original relationships lowers the reliability, or may completely negate the significance, of such relationships in reconstructing the activities and sequence of events that occurred at the site;
- Intrusions to or alterations of a cultural property or its setting may affect the integrity of the property. Structural additions, graffiti, and surrounding audio or visual intrusions may be inconsistent with the original cultural resource values and may affect the scientific or aesthetic importance of the property. Traditional uses of cultural properties can be impacted by modern intrusions that are out of character with the values (e.g., sacred or ceremonial) ascribed to the resource;
- Intrusions to the visual, atmospheric, or aural setting of cultural resources, especially cultural landscapes associated with National Historic Trails, can extend a considerable distance from the location of the resource;
- Many cultural resources are situated on or just below the ground surface and are very susceptible to impacts from vehicle use, vegetation removal and treatments, animal trampling, fire, and all forms of ground disturbance;
- Vandalism or unauthorized collecting or excavation can destroy a cultural resource in a single incident. Exposure of cultural resources, dissemination of resource locations, and access to areas where cultural resources are present can increase the risk of vandalism or unauthorized collection of materials;

- Population growth, urban encroachment, sprawl, and development on adjacent lands will increase the risk of impacts on BLM-managed cultural resources through recreation, visitation, vandalism, and changes in setting;
- Measures that withdraw land or restrict access or surface development to protect natural or cultural resources can provide direct and indirect protection of TCPs, National Historic Trails, and other cultural resources from disturbance, incompatible activities, and unauthorized activities;
- Federal and BLM requirements of consultation, a site-specific inventory, and an evaluation and impact analysis through the Section 106 process provide a systematic and proactive means of addressing direct impacts on cultural resources from authorized undertakings, projects, and actions. Nearly all implementation actions would be subject to further cultural resource review, and the Section 106 process would be completed before site-specific projects are authorized. If adverse effects were found, mitigation measures, including avoidance, would be implemented to minimize the effects. Formal agreement documents may be used in completing the Section 106 process for broad implementation actions;
- Cultural resources are nonrenewable. While impacts on many cultural resources are mitigable through data recovery and other means, impacts on TCPs, National Historic Trails, and some other cultural resource types, such as Lovelock Cave, are difficult or impossible to mitigate unless the sites and associated settings are avoided. Opportunities for further research and interpretation of archaeological sites can be lost when impacts are mitigated through data recovery;
- Site monitoring, research, inventories not related to projects, site stabilization, public interpretation, and other proactive management activities would continue; and
- As additional inventories are completed in the WDO, more cultural resource sites in the planning area would be identified and evaluated. Knowledge of these resources would aid in their protection from inadvertent impacts, would add to the understanding of cultural resources both in surveyed and unsurveyed areas, and could increase the BLM's workload in site protection, monitoring, and data recovery.

Watchable wildlife viewing sites are not addressed because management actions are not expected to affect cultural resources.

Effects from Air Quality Management

Effects Common to All Alternatives

There are few likely impacts on cultural resources resulting from air quality objectives or actions under any of the alternatives. Airborne particulates and emissions can impact the visual and atmospheric setting of cultural resources, including National Historic Trails and TCPs in areas where these resources are present. All of the alternatives include general provisions to reduce and control airborne particulates and emissions. Effects of all of the alternatives on cultural resources are similar.

Effects from Geology Management

Effects Common to All Alternatives

Many of the identified unique geological and other features are Native American areas of concern, archaeologically sensitive areas (for example, the Lake Lahontan shoreline features) or are near National Historic Trails. There are no geology management actions that are common to all alternatives. Alternatives that protect unique geologic features would also protect the physical integrity and settings of known and potential Native American sacred sites and TCPs, as well as National Historic Trail segments and archaeologically sensitive areas. Alternatives that provide lesser degrees of protection could lead to impacts, including destruction of these resources and their settings. Mineral sales and locatable mining can destroy and otherwise impact Native American sacred sites and TCPs and the settings of National Historic Trails. Although most impacts on archaeologically sensitive areas would be addressed through the Section 106 process, sites that are NRHP eligible for reasons other than data potential could be impacted by mining. Unrestricted OHV use increases the likelihood of impacts on the physical integrity and setting of archaeological sites, sacred sites, and TCPs; limiting OHV use to existing roads reduces the likelihood of this occurring. While some of the proposed features are along well traveled roads, encouraging visitation to features in more remote areas where there are sensitive cultural resources could lead to increased impacts from ground disturbance, alterations to setting, and unauthorized collection and vandalism. Public education efforts could help mitigate some of these impacts.

Individual Effects under Alternative A

Continuing to permit mineral sales and locatable mining in the vicinity of unique geologic resources could destroy or otherwise impact the physical integrity and setting of Native American sacred sites and TCPs, the setting of National Historic Trails, and the setting and physical integrity of some archaeological sites. Unrestricted OHV use could also lead to impacts on the physical integrity and setting of cultural resources and unauthorized collection and vandalism.

Individual Effects under Alternative B

Mineral sales and locatable mining could destroy or otherwise impact the physical integrity and setting of Native American sacred sites and TCPs, the setting of National Historic Trails, and the setting and physical integrity of some archaeological sites. Limiting OHV use to existing roads and trails would reduce the likelihood of impacts on physical integrity and setting of archaeological sites, sacred sites, and TCPs off the roads from current conditions. Encouraging visitation may increase some potential impacts in some areas from physical damage, alterations to setting, and unauthorized collection and vandalism.

Individual Effects under Alternative C

Managing areas of unique geologic interest as exclusion zones for rights-of-way and other discretionary actions, withdrawal from the General Mining Law, closure to salable mineral disposal and, restricting all OHV use would reduce the likelihood of impacts on physical integrity and setting of associated archaeological sites, sacred sites, and TCPs from ground disturbance, alterations to setting, and unauthorized collection or vandalism. Alternative C would be the most protective of cultural resources associated with these geologic features.

Individual Effects under Alternative D

Alternative D would improve current protection for archaeological sites, sacred sites, and TCPs associated with unique geologic features from ground disturbance, alterations to setting, and unauthorized collection or vandalism. Limiting OHV travel to existing roads and trails and allowing discretionary activities if impacts were mitigated would be somewhat less protective than Alternative C. Impacts on the TCPs present and some other cultural resource types may be difficult or impossible to mitigate unless the sites and associated settings were avoided.

Effects from Soil Resources Management

Effects Common to All Alternatives

Because many cultural resource sites are situated on or just below the ground surface, they are susceptible to damage and destruction from ground disturbance and erosion. Damage can include modification of site spatial relationships and displacement and damage of artifacts, features, and midden deposits. This can result in the loss of information relevant to the site function, dates of use, plants and animals used, past environments, and other important research questions. Measures under all of the alternatives limiting soil erosion and managing ground-disturbing activities would indirectly help protect these cultural resources. Reclamation measures may also preserve or restore the setting of cultural resources.

Individual Effects under Alternative A

In general, indirect protection of cultural resources from soil erosion, compaction, and ground-disturbing activities or reclamation requirement would be less under Alternative A because current management requires fewer specific actions than do the other alternatives.

Individual Effects under Alternative B

Fewer mitigations for reducing the loss of biological soil crust are required, so Alternative B would be less protective of archaeological sites against increased erosion in affected areas. The components of soil surface, vegetation, soil litter, and biologic crusts would be maintained or improved, rather than just encouraged, as under Alternative A. This would increase protection against erosion and soil-disturbing activities, and would reduce the risk of impacts on cultural resources, especially archaeological sites. Reclamation requirements may also restore the setting of cultural resources.

Individual Effects under Alternative C

Alternative C provides the highest level of required stipulations and mitigations for soil-disturbing activities, reclamation, and erosion control, which could indirectly reduce the risk of impacts on cultural resources from erosion and ground disturbance impacts or could require reclamation, which may restore the setting of cultural resources.

Individual Effects under Alternative D

Indirect protection of cultural resources would be similar to that defined for Alternative C. Stipulations and mitigations for soil-disturbing activities, reclamation, and erosion control would be fewer than under Alternative C and would allow the BLM more discretion in applying them.

Effects from Water Resources Management

Effects Common to All Alternatives

Water is considered sacred to the tribes that use the WDO. Some water sources and features have been identified as TCPs, and others would likely be considered TCPs if they were evaluated. Actions under all alternatives that protect and maintain water features, water quality, stream flows, water temperature, fisheries, and natural resources associated with water features would help preserve these tribal values and traditional resources. Actions to develop wells, acquire water sources, and modify springs include risks of disturbance of cultural resources and traditional uses and values through ground-disturbing activities, changes in access, visibility, and setting of water features and changes to the water features themselves.

Individual Effects under Alternative A

Current management specifies fewer actions than the other alternatives that would indirectly protect tribal values associated with water features, water quality, stream flows, water temperature, fisheries, and other natural resources that depend on water features.

Individual Effects under Alternative B

Additional measures to manage priority watersheds and protect well heads would provide more protection for water features and preserve the opportunity to pursue tribal uses. Commercial development of water sources could lead to additional risk of impacts on cultural resources and traditional uses and values through ground-disturbing activities, changes to the water features themselves, changes in access, visibility and setting of water features.

Individual Effects under Alternative C

Managing priority watersheds and well head protection as exclusion zones would provide additional protections for water features and preserve the opportunity to pursue tribal uses. Water import or export projects would be permitted only if they were not to exceed the perennial yield of the source basin and could be implemented without compromising the multiple use mandate of FLPMA. This would reduce the risk of impacts on cultural resources and traditional uses and values through ground-disturbing activities, changes in access, visibility and setting of water features, and changes to the water features themselves. If culturally significant water features or tribal values were present, any impacts would be difficult to mitigate, but the BLM would seek to mitigate any adverse effects to acceptable levels, in consultation with affected groups. Alternative C reduces the risk of impacts on cultural resource impacts more than the other alternatives.

Individual Effects under Alternative D

Managing priority watersheds as avoidance zones and permitting water importation or exportation projects only if impacts could be mitigated to acceptable levels would protect water features and would preserve the opportunity to pursue tribal uses. The risk of impacts are similar to but than those proposed under Alternative C.

Effects from Vegetation—Forest and Woodland Products Management

Effects Common to All Alternatives

Actions under all alternatives to monitor forest health and SOPs (Appendix B) to reduce impacts on woodland habitats would help protect forests and forest resources such as pine nut gathering areas that are culturally important to tribes and preserve culturally modified trees. Maintaining opportunities for tribal groups to harvest pinyon trees and exercise this practice at recognized traditionally used sites is included in all alternatives. Because the Stillwater Pinyon Forest is threatened by mistletoe and other infestations, treatments to maintain and enhance the health of the forest would help to preserve TCPs and areas of concern to tribes, if treatments were undertaken in consultation with the tribes. Forest vegetation treatment methods can impact cultural resources from removal, ground disturbance, erosion, fire, changes in setting, increased access, visibility and activity in the vicinity of cultural resources, and temporary loss of access and setting of any TCPs present. Prescribed burns and unsuppressed wildfires could devastate areas of Native American concern if control of these fires is lost. With current climatic conditions, these forests may not come back. Controlled prescribed fire could help improve the health of the forest but residual unanticipated impacts on cultural resources could occur where these resources are undiscovered or have not been inventoried.

Individual Effects under Alternative A

Effects are similar to those described as common to all alternatives. Wildland fire would be suppressed, reducing the potential for impacts on cultural resources from wildland fire. Alternative A specifies additional protections for pinyon and juniper stands that are culturally important to Native Americans.

Individual Effects under Alternative B

Changes in management of pinyon and juniper stands that are culturally important to Native Americans would impact traditional uses and TCPs. Removing current restrictions on Christmas tree cutting, green pinyon cutting and firewood cutting activities would damage trees and groves that have been traditionally used for pine nut gathering for generations, impacting the viability and continuity of these cultural traditions. Commercial harvests of pine nuts would compete with the supply available for traditional uses and users and may impact TCPs and their setting and expression of cultural practices. Expanding the use of wildland fire can result in direct disturbance to or loss of cultural resources through the destruction or modification of structures, features, artifacts, cultural use areas, pinyon stands and culturally modified trees. Fire can also lead to other indirect impacts, such as damage from erosion and unauthorized collection and vandalism. Treatments to control mistletoe and other infestations in the Stillwater Pinyon Forest would help to preserve TCPs and other areas of tribal concern, if undertaken in consultation with the tribes. While controlled prescribed fire could help improve the health of the forest, if control of prescribed or wildland fire is lost, areas of Native American concern could be devastated. With current climatic conditions, these forests may not come back. Some effects of wildland fire on cultural resources could be avoided if cultural resource considerations are incorporated into fire management planning objectives, priorities and actions.

Individual Effects under Alternative C

Retaining and expanding restrictions on harvest of pinyon stands, Christmas tree cutting, firewood cutting, and green pinyon cutting would protect traditional cultural practices related to tribal use areas. Allowing natural fire regimes to return in lieu of prescribed fire would expand the potential for impacts on cultural resources because prescribed fire can reduce the frequency and intensity of wildland fire by reducing fuel loads. Fires would be suppressed to the extent possible which would reduce the potential for impacts on cultural resources from wildland fire. Suppression, however, can include ground-disturbing activities that can directly impact cultural resources by altering spatial relationships. Some effects of wildland fire and suppression on cultural resources would be avoided through cultural resource considerations incorporated into fire management planning objectives, priorities and actions. Fire could devastate areas of Native American concern if control of these fires is lost. With current climatic conditions, these forests may not come back. The potential beneficial effects on cultural resources from treatment projects may be less than other alternatives because there would be no active treatments on 27,605 acres of old growth forest and treatments would be limited to mechanical and biological methods when practical and feasible. Avoiding chemical treatments may prevent adverse effects on the health of tribal users who may have cultural uses for the targeted plant species.

Individual Effects under Alternative D

Allowing the BLM more discretion in actively managing pinyon stands may lead to fewer impacts on cultural resources from wildland fire than under Alternative C but potentially more direct impacts from the harvest of forest products. Impacts from prescribed fire and allowing fire for resource benefit would be the same as under Alternative B. Careful use of treatments, protection of green pinyon, and selective harvest in consultation with tribal groups would help maintain the health of culturally important pinyon stands and the long-term pursuit of traditional practices.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

In the long term, treating weeds would indirectly reduce the risk on cultural resources from wildland fire and suppression, would reduce erosion of archaeological sites, would restore native species important to tribal users, and would help restore the setting of cultural landscapes and TCPs. Chemical treatments may affect or target other culturally important resources or have negative health effects on tribal users. Treatments may result in changes to setting and temporary loss of access or availability of certain areas for cultural practices during treatment.

Individual Effects under Alternative A

Because current management specifies fewer actions than the other alternatives to prevent or treat for weeds and specifies no measures targeting invasive weeds, the potential positive effects on cultural resources from reduced risk of wildland fire and suppression, erosion reduction, native species, and setting restoration would be reduced. Potential impacts from treatments would be less than under the other alternatives.

Individual Effects under Alternative B

Additional actions and cooperative efforts to control, prevent, and treat lands for both invasive and noxious weeds, including physical, mechanical, biological, and chemical controls, would be more effective at controlling weeds and reducing the risk of impacts on cultural resources from wildland fire and suppression and erosion and in restoring native species and settings than under Alternative A. Expanding treatments may affect plant resources used by Native Americans, increase health risks, and interfere with the use of certain areas for cultural practices during treatment. Inadvertent damage of uninventoried cultural resources could occur if control of prescribed fire is lost.

Individual Effects under Alternative C

Similar to Alternatives B and D, Alternative C would expand treatment from current levels; however impacts associated with the use of prescribed fire and chemical treatments would not occur. Fire and heat can destroy or alter artifacts and features of undiscovered resources. Chemical treatments may affect or target other culturally important resources or have negative health effects on tribal users. There would be fewer potential impacts on cultural resources and uses than under the other alternatives, but the effectiveness of weed reduction and associated potential positive effects on cultural resources from reduced risk of wildland fire and suppression, erosion reduction, native species, and setting restoration would be less than under Alternatives B and D.

Individual Effects under Alternative D

Effects are the same as those identified for Alternative B.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

Using chemical and biological pest control methods may reduce the loss of culturally modified trees, help maintain the health of culturally important pinyon stands and therefore help maintain the long-term pursuit of traditional practices associated with pine nut gathering. Treatments may affect or target other culturally important natural resources or have negative health effects on tribal resource users, so coordination with tribal groups is essential to avoid impacts.

Individual Effects under Alternative A

Effects are similar to those identified for all alternatives.

Individual Effects under Alternative B

Effects are the same as those identified for all alternatives, but Alternatives B, C, and D may lead to increased use and impact potential, as described above.

Individual Effects under Alternative C

Effects are similar to those described for all alternatives, but Alternatives B, C, and D may lead to increased use and impact potential, as described above. Because chemicals would not be used there would be no potential for health impacts on traditional users or loss of other culturally important resources.

Individual Effects under Alternative D

Effects are the same as those identified for Alternative B.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Maintaining and restoring vegetation cover on rangelands would help protect cultural resource sites that are situated on or just below the ground surface and are susceptible to damage and destruction from ground disturbance, erosion, and increased wildland fire. Measures to rest land, restrict grazing, fence sensitive areas, and disperse impacts from riparian areas would also protect cultural sites from ground disturbance. Restoring desired native species may include plants used or valued by tribal users and help retain historic settings. Encouraging fire rehabilitation use or restoring nonnative plants can increase the potential for impacts on historic settings and native gathering areas. Controlling woodland encroachment onto rangelands could impact pinyon and juniper stands and pine nuts that are culturally important. Residual unanticipated impacts on cultural resources could occur from treatments and there could be short-term impacts on TCPs from changes in setting and loss of access during treatment.

Individual Effects under Alternative A

Effects of current management are similar to those described as common to all alternatives. By specifying fewer biological, chemical, and prescribed fire treatments than the other alternatives, the potential direct impacts from treatments are less than under the other alternatives. Because fewer actions enhancing vegetation communities and rehabilitating habitat after a fire would be specified, anticipated benefits to cultural resources from erosion reduction, risk of wildland fire, restored plants, and settings would not be as likely to occur.

Individual Effects under Alternative B

By expanding the scope of active rangeland treatments and targeting 70,000 acres of rangeland improvements, a reduction in impacts on surface cultural resource sites from loss of vegetated cover and wildland fire would be anticipated. By emphasizing the use of nonnative species for rehabilitation and reclamation, there would be an increase in the potential for impacts on historic settings and native gathering areas. Efforts to enhance sagebrush vegetation and sage-grouse habitat would improve these resources valued by Native Americans, but not as much as would Alternatives C and D.

Individual Effects under Alternative C

Promoting native plant communities through the use of native seed, longer rest periods for plant establishment and recovery from livestock, and natural recovery would improve the setting of cultural resources and restore plants that may be important to tribal users. Treatments would improve the preservation of surface cultural resource sites from loss of vegetated cover and wildland fire, but restoration may be less effective and take more time. Measures under Alternative C for enhancing sagebrush vegetation and sage-grouse habitat would improve these resources valued by Native Americans more than would the other alternatives.

Alternative C, Option 1

Ground disturbance, trampling and erosion, and other ongoing impacts on cultural resources associated with grazing would continue, but at a reduced rate.

Alternative C, Option 2

Restricting livestock grazing would eliminate impacts on cultural resources from this activity.

Individual Effects under Alternative D

Impacts on surface cultural resource sites from loss of vegetated cover and wildland fire would be reduced by expanding the scope of active rangeland treatments and by targeting 70,000 acres of rangeland improvements. By emphasizing the use of native species for rehabilitation and reclamation, there would be less potential for impacts on historic settings and native gathering areas. Efforts under Alternative D to enhance sagebrush vegetation and sage-grouse habitat would improve these resources valued by Native Americans more than would Alternatives A and B.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

Improving or restoring riparian and wetland areas may affect the cultural resources and cultural uses that are often associated with these areas. Restrictive buffers around streams and water bodies and closures to prevent actions that would degrade riparian conditions would indirectly protect cultural resources within these areas. Restoration would enhance archaeological site preservation and the setting of TCPs. Culturally modified trees and natural resources and water features important to contemporary Native Americans would be protected and enhanced. Measures to control woodland encroachment onto riparian and wetland zones could impact pinyon and juniper stands that are culturally important to contemporary Native Americans.

Individual Effects under Alternative A

By specifying fewer actions, goals, and treatments for maintaining or improving wetlands and riparian areas than the other alternatives, the potential direct impacts on cultural resources from treatments are less than under the other alternatives. Reductions in erosion, enhanced site preservation, and the protection of any culturally important natural resources and water features would also be less.

Individual Effects under Alternative B

Setting additional goals and BMPs for improving riparian and wetland areas and addressing nongrazing impacts on riparian and wetland areas would provide more long-term indirect protection to cultural resources by reducing the potential for erosion of archaeological sites and enhancing natural resources that may be culturally significant.

Individual Effects under Alternative C

By emphasizing the use of natural processes, Alternative C has the least potential for impacting cultural resources through treatments, construction of structures, alternative water developments,

exclusion fencing, vegetation manipulation, and changes to setting. By specifying the highest goals for improving riparian areas, the preservation and protection of cultural resources from erosion and other ground disturbance would be improved more than the other alternatives in the long-term. Restoring native plants and natural resources important to tribal groups would help maintain cultural practices and traditions and the setting of TCPs.

Alternative C, Option 1

Ground disturbance, trampling and erosion, and other ongoing impacts on cultural resources associated with grazing would continue, but at a reduced rate.

Alternative C, Option 2

Restricting livestock grazing would eliminate impacts on cultural resources from this activity.

Individual Effects under Alternative D

Effects are similar to those identified for Alternative C, Option 1, except that there would be fewer expected long-term improvements to the protection and preservation of sites and culturally significant species from riparian restoration.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

Improvements to land health and aquatic habitat and restrictions on access and stream bank alterations could increase soil stability, provide vegetative cover, and reduce ground disturbance, thereby improving protection of surface cultural resources. Maintaining and improving habitat for waterfowl, fish, and other wildlife could preserve opportunities to maintain traditional uses associated with native wildlife. Actions to enhance sagebrush vegetation and sage-grouse habitat would improve these resources valued by Native Americans but may reduce available pinyon acreage. Actions to maintain spring resources could help protect water features that are culturally important to tribes but could include risks of direct disturbance or alteration of the setting of cultural resources through ground-disturbing activities, construction, fencing, increased access, visibility and activity.

Individual Effects under Alternative A

Effects are similar to those described as common to all alternatives. Current restrictions and protections for habitat and species that indirectly protect cultural resources or enhance species that are important to Native Americans would continue, but there would be fewer specific measures and objectives than the other alternatives.

Individual Effects under Alternative B

By designating Priority 2 wildlife habitats for sagebrush and sage-grouse as avoidance areas for certain activities and construction, indirect risks of impacts on cultural resources would be reduced in those areas. Efforts to enhance sagebrush vegetation and sage-grouse habitat would improve these resources valued by Native Americans, but not as much as would Alternative C and D. Similar

to Alternative D, new percentage limits on stream bank alterations would protect cultural resources in these areas from direct surface disturbance.

Individual Effects under Alternative C

Closure and avoidance requirements for the expanded Priority 1 and Priority 2 wildlife habitat areas would provide indirect protections of cultural resources, TCPs, and National Historic Trails from direct disturbance, the effects of erosion, and alterations to setting. Alternative C would provide the highest amount of habitat preservation for sage-grouse and would improve these resources valued by Native Americans. Fencing and OHV closure at Gridley and Continental Lakes would reduce ground disturbance and potential for damage to the cultural resources present. Removal of artificial water developments may lead to the loss or migration of culturally important species. Alternative C would provide the most limits on stream bank alterations, which would protect cultural resources in these areas from direct ground disturbance and effects on setting.

Individual Effects under Alternative D

Effects of Alternative D are similar to those described for Alternative B. Increasing Priority 1 and Priority 2 closure and avoidance areas would provide additional indirect protection from ground disturbance and alteration to settings than under Alternatives A and B but less than under Alternative C. Alternative D would be less effective at protecting sagebrush and sage-grouse valued by Native Americans than would Alternative C. Similar to Alternative B, new percentage limits on stream bank alterations would protect cultural resources in these areas, but to a lesser extent than under Alternative C.

Effects from Special Status Species Management

Effects Common to All Alternatives

Measures to protect special status fish, wildlife, and wildlife habitat include a variety of restrictions, buffers, closures, height limits, and bat gates that would limit activities that are incompatible with maintaining special status species. These actions could indirectly reduce the potential for disturbance of cultural resources, vandalism, and unauthorized collecting. These measures would reduce visual interference and noise, thus preserving the setting of the cultural resources. Some actions, such as the installation of bat gates, would affect visual setting and access to caves. Culturally important species would be protected and enhanced, but there may also be loss of access to TCPs.

Individual Effects under Alternative A

Effects are similar to those identified for all alternatives.

Individual Effects under Alternative B

Permitting prescriptive grazing within wet meadows and riparian areas may lead to additional impacts on cultural resources because cultural resources, TCPs, and culturally important plants are often associated with riparian areas. Potential impacts include trampling, soil disturbance, erosion, displacement of artifacts and site contents, and loss of culturally significant plants. Prohibiting high profile structures near sage-grouse leks may help preserve the setting of National Historic Trail resources and TCPs.

Individual Effects under Alternative C

Effects are similar to those identified for all alternatives. The potential for effects on cultural resources are the least under Alternative C because measures to protect special status species and their habitats would restrict or prohibit activities in more areas than the other alternatives. Prescriptive grazing would not be permitted within wet meadows and riparian areas, which could protect cultural resources from ground disturbance, trampling and erosion, and other ongoing impacts on cultural resources associated with livestock grazing. Cultural resources, TCPs, and culturally important plants are often associated with riparian areas.

Individual Effects under Alternative D

Effects are similar to those identified for Alternative B.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

Ongoing effects of wild horses and burros on cultural resources are similar to those for livestock grazing. Grazing and trampling reduces vegetative cover and disturbs the soil, which accelerates erosion and weathering. Cultural resources are directly impacted by the modification, displacement, and loss of artifacts, features, and middens. This results in the loss of valuable cultural resource information regarding site function, date of use, subsistence, past environments, and other research questions. Trampling and grazing can also impact TCPs, traditional use areas, and culturally important plants from the actions of livestock. Effects can be intensified when animals are concentrated near water sources where cultural resources are likely to be present. Maintaining HMAs and HAs could also impact cultural resources by concentrating impacts in defined areas while reducing impacts in other areas. Improving rangeland health could reduce the potential for impacts on cultural resources due to direct disturbance and erosion. Measures protecting wild horses and burros through restrictions on motor vehicle racing and other activities may also limit disturbance of the physical integrity and setting of cultural resources.

Individual Effects under Alternative A

Effects are similar to those identified for all alternatives, except that this alternative allows for construction of fences, which may be necessary to protect cultural resources and traditional use areas.

Individual Effects under Alternative B

Effects are the same as those identified for Alternative A.

Individual Effects under Alternative C

Effects are similar to those identified for all alternatives except that the construction of fences, which may be necessary to protect cultural resources and traditional use areas, would not be allowed.

Alternative C, Option 1

Ground disturbance, trampling and erosion, and other ongoing impacts on cultural resources associated with livestock grazing would continue.

Alternative C, Option 2

Ground disturbance, trampling and erosion, and other ongoing impacts on cultural resources associated with live stock grazing would cease, but similar lesser impacts from wild horses and burros would continue.

Individual Effects under Alternative D

Effects are the same as those identified for Alternative B.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Fire can result in direct disturbance or loss of cultural resources through the destruction or modification of structures, features, artifacts, cultural use areas, and culturally modified trees. Organic materials and the information that can be obtained from their study are especially vulnerable to heat damage, but intense fire can damage stone as well. Fire control and suppression can involve ground-disturbing activities that can also directly impact cultural resources by altering the spatial relationships of archaeological sites. Fire can also result in impacts through erosion and the increased visibility of cultural resources. Fire can remove vegetation and expose previously undiscovered resources, allowing their study and protection; however, sites exposed by fire or flagged for fire avoidance in prescribed burns can be susceptible to unauthorized collection and vandalism. There could also be impacts on cultural resources from ground disturbance associated with fuel treatments and rehabilitation, the effects of chemicals and fire, and the introduction of seeds and pollens, which could affect the accuracy of paleobotanical data on archaeological sites.

The risk of impacts on cultural resources is greatest from unplanned wildland fire since the locations of cultural resources are less likely to be known and avoided during the fire and fire suppression. Restrictions under the WFSA and minimum impact suppression tactics are designed to avoid or minimize impacts on sensitive cultural resources. Avoiding the use of retardant to protect open water sources could also protect culturally important water features. Fire breaks are planned and placed to avoid and protect known cultural resources.

Cultural resources would be considered before any planned fuel reduction and restoration of native vegetation. In the long-term, culturally important native plant and animal species should benefit from fire management tools. Areas considered for allowing fire for resource benefit are a large portion of the Stillwater Range, which contains a pinyon forest, and TCPs, which are valued by Native Americans, as well as other areas containing cultural sites that are vulnerable to fire. These include Basque aspen carvings, ethnographic sites, and historic structures and wood cutting areas. While fire can be used as a tool to improve the health of forests such as the Stillwater Range, under current conditions there is a high risk that control of the fire could be lost, devastating the forest for generations to come and destroying other valuable archaeological and tribal resources. Other impacts are the same as those described in Vegetation—Rangeland Management.

Individual Effects under Alternative A

Current management emphasizes full suppression of wildfires which reduces the potential for impacts on cultural resources from wildland fire. Suppression, however, can include ground-disturbing activities that can directly impact cultural resources by altering spatial relationships of artifacts and features. Types of effects are the similar to those identified for all alternatives. Where there are insufficient resources for full suppression of wildfires, the BLM would prioritize suppression, perhaps resulting in impacts on cultural resources that may have otherwise been avoided.

Individual Effects under Alternative B

Effects are similar to those described for all alternatives, except that 110,167 acres are identified as priority areas where fire may be used to provide resource benefits. Because Alternative B designates suitable fire use areas within the Stillwater Range and other areas containing cultural sites, including pinyon gathering areas, Basque aspen carvings, ethnographic sites, and historic structures and wood cutting areas, there is a high risk of the loss of cultural resources from fire. The risk of impacts on cultural resources is greatest from unplanned wildland fire because the locations of cultural resources would be less likely to be known and avoided during the fire and fire suppression. Cultural resource inventory and fire management prescriptions in fire management plans could help prevent these impacts. However, if control of the fire was lost, these impacts could still occur.

Individual Effects under Alternative C

The effects are the same as those identified for Alternative A, except that there would be priority fire suppression areas established and thus additional protection from wildfire for ACECs, cultural areas and TCPs, and culturally important vegetation communities.

Individual Effects under Alternative D

Effects are similar to those identified for all alternatives, except that 9,932 acres are identified as priority areas where fire may be used to provide resource benefits. This is fewer acres than under Alternative B and avoids more culturally sensitive areas.

Effects from Cultural Resources Management

Effects Common to All Alternatives

Impacts on cultural resources from proposed land use authorizations would be minimized or avoided by complying with laws and executive orders designed to preserve and protect cultural resources. Complying with management measures for authorized actions requires consulting with federally recognized tribes and other interested parties, identifying and evaluating cultural resources, and adhering to procedures for resolving any adverse effects and mitigating impacts. Completion of the Section 106 process is required for all federal undertakings implementing resource management plan decisions. There is a greater risk of impacts resulting from unauthorized activities, natural processes, dispersed activities, and incremental or inadvertent human actions, especially where inventories are incomplete.

Cultural resource management measures would help identify, preserve, protect, and reduce impacts on cultural resources. Ongoing and planned management measures include the following:

- Conducting inventories, managing NRHP-eligible resources for conservation and protection;
- Avoiding adverse effects as the preferred mitigation;
- Consulting with federally recognized tribes;
- Patrolling and monitoring vulnerable cultural resource areas;
- Cooperating with groups to identify and evaluate trail segments for the NRHP;
- Protecting aspen art trees and groves;
- Maintaining National Historic Trail segments
- Partnering with academic, educational, and tribal groups for research projects;
- Working with the tribes on implementing management measures to ensure the sustainability of traditional use areas associated with pine nut gathering;
- Issuing free use permits to tribes for pine nut harvesting and dead and down firewood gathering would help tribes continue their traditional practices; and
- Thinning, prescribed fire, and other tools would be used to control disease and maintain the health of the forest, helping to preserve tribal values.

Individual Effects under Alternative A

Allowing OHV use on most of the planning area, especially in the vicinity of the National Historic Trail resources and Lovelock Cave risks direct impact on archaeological sites and other cultural resources present. Open OHV use can impact cultural resources and trail segments through direct disturbance of site structure, artifact breakage and displacement, vandalism, soil compaction, altered surface water drainage, erosion, creation of new routes, and visual and aural intrusions to setting. OHV use can also facilitate access to any TCPs present for cultural uses, but it could also increase the risk of impacts on all cultural resources from unauthorized collection or vandalism.

Maintaining a VRM Class II objective within six miles of the CNHT centerline or to the visual horizon within the six-mile zone would continue to provide the highest objective among the alternatives for protecting the visual setting of the trail. However current roads, utilities, and other developments are inconsistent with this objective. The lack of viewshed protection for the Lovelock Cave Backcountry Byway would continue, and impacts on the setting of this resource may occur. The integrity of the setting of historic trails could be impacted by fluid mineral leasing and material sales.

Individual Effects under Alternative B

Effects of OHV use on cultural resources are the same as those identified for Alternative A. Reducing the current objective for the CNHT trail to VRM Class III overall and VRM Class IV along I-80 and the utility corridor would allow additional intrusion on the viewshed of the historic trail, would affect the visitor experience of the setting of the trail, and could indirectly result in the loss or damage of trail resources through development in the trail corridor. Adding a VRM Class III

objective to the Lovelock Cave Backcountry Byway and Lovelock Cave would increase protection from current levels but would still allow moderate change that could reduce the future integrity of the visual setting. The integrity of the setting of historic trails could be impacted by fluid mineral leasing and material sales.

Changes in management of pinyon and juniper stands that are culturally important to Native Americans would impact traditional uses and TCPs. Removing current restrictions on Christmas tree cutting, green pinyon cutting, and firewood cutting would damage trees and groves that have been traditionally used for pine nut gathering for generations, impacting the viability and continuity of these cultural traditions. Commercial harvests of pine nuts would compete with the supply available for traditional uses and users and may interfere with the setting of TCPs and expression of cultural practices.

Implementing additional proactive cultural resource management measures, such as public interpretation, inventory priorities, sensitivity modeling, and categorizing known resources into use categories for planning purposes, would help the BLM identify, protect, and educate the public about significant cultural resource resources.

Individual Effects under Alternative C

Limiting OHV use to existing roads and trails in the vicinity of the Lovelock Cave Backcountry Byway, the CNHT trail viewsheds, and other sensitive areas and closing OHV use to Class I segments of National Historic Trails would provide additional protection from surface disturbance, vandalism, and intrusions to the setting of cultural resources. Retaining the current VRM Class II objective for the CNHT, adding a VRM Class II objective to the Lovelock Cave Backcountry Byway, and removing sensitive trail viewsheds from consideration for disposal would provide the highest objectives among the alternatives for protecting the visual setting of the trail. New restrictions on fluid and solid mineral surface occupancy and mineral material sales within one mile of the CNHT and historic trails would avoid potential effects from surface disturbance of trail resources and additional alterations to setting in those areas.

Continuing current restrictions on harvest of green pinyon and commercial and noncommercial harvests of woodland products and Christmas trees in the Stillwater Range would protect tribal uses of these resources and would help ensure the continuity of these practices. Expanding the proactive cultural resource management measures and interpretative programs would increase appreciation of the history and cultural resources present and enhance opportunities for public use and protection.

Individual Effects under Alternative D

Effects are similar to those identified for Alternative C. Historic landscapes along CNHT would be managed to VRM Class II, Class III, and Class IV objectives, based on an assessment of the actual scenic values present. While a reduction from current objectives, this action would allow the BLM to assess impacts on the visual setting of trail resources based on the existing character of the landscape.

Effects from Tribal Consultation

Effects Common to All Alternatives

Consultation with tribal groups on project effects and land use planning is a complementary and required part of cultural resource management. Efforts to document, recognize, and include confidential tribal knowledge and concerns in the identification and management of cultural resources, especially traditional use areas and TCPs, enhance the management of these cultural resources. Impacts on TCPs and sacred sites can be very difficult and, in some cases, impossible to adequately mitigate to the satisfaction of all parties. The potential for impacts on cultural resources would be reduced by actions to protect traditional religious practices and sites, land forms, burial sites, resources, and other areas of concern by designating SMAs or emergency, temporal, or seasonal closures.

Individual Effects under Alternative A

Effects are similar to those identified for all alternatives.

Individual Effects under Alternative B

Effects are similar to those identified for all alternatives.

Individual Effects under Alternative C

Effects are similar to those identified for all alternatives. Alternatives C and D also propose periodic meetings as an effective and proactive approach to engage the tribes in planning future land use actions and avoiding cultural resource impacts.

Individual Effects under Alternative D

Effects are similar to those identified for all alternatives. Like Alternative C, Alternative D also proposes periodic meetings as an effective and proactive approach to engage the tribes in planning future land use actions and avoiding cultural resource impacts.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Identification and protection measures for paleontological resources may also lead to the identification and protection of cultural resources. Scientific study of these resources may provide additional information on paleo-environments and other research questions relevant to the cultural resources of the WDO.

Effects from Visual Resources Management

Effects Common to All Alternatives

VRM Class I and II designations provide protection of cultural resources where visual setting is a contributor to the significance of the property or the traditional use. Use of the visual resource contrast rating system during project planning could reduce the impact of visual intrusions on cultural resources, especially National Historic Trails. Visual intrusion on the setting of cultural

resources must be considered in the Section 106 process and tribal consultation, regardless of VRM designation. Risk of impacts on cultural resources in VRM Class I areas could also be indirectly reduced where designations limit surface-disturbing activities in these areas.

Individual Effects under Alternative A

Effects are similar to those described for all alternatives. There would be no change in the current VRM designations and protection of the visual setting of cultural resources; national trail viewsheds would remain the same. Maintaining a VRM Class II objective within six miles of the CNHT centerline or to the visual horizon within the six-mile zone would continue to provide the highest objective among the alternatives for protecting the visual setting of the trail. However, current roads, utilities, and other developments are inconsistent with this objective. The lack of viewshed protection for the Lovelock Cave Backcountry Byway would continue, and impacts on the setting of this resource may occur.

Individual Effects under Alternative B

Lands designated as VRM Class I or VRM Class II would be less than all of the other alternatives. Protection of the visual setting of cultural resources and historic landscapes would be reduced from current levels and indirect protections VRM Class I areas would be reduced by 2,666 acres.

Reducing the current objective for the CNHT trail to VRM Class III overall and VRM Class IV along I-80 and the utility corridor would allow additional intrusion on the viewshed of the historic trail, would affect the visitor experience of the setting of the trail, and could indirectly result in the loss or damage of trail resources through development in the trail corridor. This designation provides the least protective objective among the alternatives for the visual setting of the trail. Adding a VRM Class III objective to backcountry byways would increase protection of the integrity of the visual setting of the Lovelock Cave Backwater Byway from current levels but would still allow moderate change that could reduce the future integrity of the visual setting.

Individual Effects under Alternative C

Protection of the visual setting of cultural resources and historic landscapes would be increased from current levels. Lands designated as VRM Class I or VRM Class II would be greater than all of the other alternatives. Retaining the current VRM Class II objective for the CNHT and adding a VRM Class II objective to the Lovelock Cave Backcountry Byway would provide the highest objectives among the alternatives for protecting the visual setting of the trail.

Individual Effects under Alternative D

Effects are similar to those described for Alternative C. Historic landscapes along CNHT would be managed to VRM Class II, Class III, and Class IV objectives, based on an assessment of the actual scenic values present. While a reduction from current objectives, this action would allow the BLM to assess impacts on the visual setting of trail resources based on the existing character of the landscape. There would be some reduction from Alternative C in overall VRM Class II acres and the indirect protection they may provide to the visual setting of cultural resources.

Effects from Cave and Karst Resource Management

Effects Common to All Alternatives

There are no effects common to all alternatives from cave and karst resources.

Individual Effects under Alternative A

There are no actions addressing caves and karsts under this alternative and thus no impacts on cultural resources.

Individual Effects under Alternative B

Caves and karsts are often the location of cultural resources and places that are important to Native Americans. Protecting caves and karsts is complementary to other cultural resource management goals if access for traditional uses is maintained and interpretation does not lead to use impacts from visitation or vandalism.

Individual Effects under Alternative C

Effects are similar to those for Alternative B. By allowing no surface disturbance within 500 feet of cave and karst entrances there would be additional protection for the setting of cultural resources and sites that may be associated the entrances. Avoiding publicizing locations could also protect cultural resources from vandalism, overvisitation, and interference with tribal uses.

Individual Effects under Alternative D

Effects are the same as those for Alternative B.

Effects from Livestock Grazing Management

Effects Common to All Alternatives

Livestock grazing is associated with ongoing impacts on cultural resources located on or near the ground surface. Improper grazing and trampling reduces vegetative cover and disturbs the soil, which accelerates erosion and weathering. Cultural resources are directly impacted by the modification, displacement and loss of artifacts, features, and middens, resulting in loss of valuable cultural resource information regarding site function, date of use, subsistence, past environments, and other research questions. Trampling and grazing can also impact TCPs, traditional use areas, and culturally important plants from the actions of livestock. Since cultural resources and TCPs are often associated with permanent and intermittent water sources and these areas are attractive to livestock, impacts on cultural resources are most likely to occur in these areas. Animals also seek shade in rock shelters and can damage cultural resource sites that are often present at those locations. Actions under all alternatives to protect springs and wetland riparian areas from livestock grazing would help protect water features and sources that may be culturally important to tribes and reduce the risk of direct disturbance and erosion of any cultural resources present. Actions that improve rangeland health could reduce the potential for impacts on cultural resources from direct disturbance, erosion, and wildland fire.

Individual Effects under Alternative A

Effects are the same as those identified for all alternatives. There would be no net change in the lands available for livestock grazing or the assigned AUMs.

Individual Effects under Alternative B

Implementing adaptive grazing management and additional rangeland improvements would reduce the risk of impacts on cultural resources from disturbance and erosion. Acres of AUMs and allotments would remain the same.

Individual Effects under Alternative C

Alternative C, Option 1

Reductions in grazed acres, closure of newly acquired lands, resting of land, less intensive grazing, and other measures to maintain the rangeland health would reduce the risk of impacts on cultural resources from ground disturbance, trampling, and erosion.

Alternative C, Option 2

Restricting livestock grazing would eliminate impacts on cultural resources from this activity.

Individual Effects under Alternative D

Effects are similar to those described under Alternative B. Because there would be fewer acres of land open to grazing, the potential for impacts on cultural resources on these 215,973 acres would be eliminated.

Effects from Minerals Management

Effects Common to All Alternatives

General

Discretionary mineral exploration and development activities are subject to further cultural resource review at each stage of development either through the Section 106 process, mine regulations or permitting stipulations. Nondiscretionary mining notices are not federal undertakings, but 43 CFR 3809 specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging them. However, mining notices must be reviewed within 15 days, and it may be difficult to determine the presence of resources in areas that have not been inventoried. Potential impacts that would be addressed include ground disturbance, erosion, intrusions to setting, access leading to unauthorized collection or vandalism, and interference with traditional cultural uses and access.

Restricting minerals activities that would affect NRHP-listed or NRHP-eligible cultural sites or requiring additional mitigations would maintain protection for these resources. WSA mineral withdrawals for preserving natural resources would provide additional indirect protection for cultural resources and TCPs in those locations from ground disturbance and setting alteration. Provisions for concurrent and interim reclamation would reduce the amount of land disturbed at

any one time, reducing the duration of alterations to setting and the potential for impacts due to erosion of cultural sites. Ongoing impacts on cultural resources in the vicinity of existing mines and drilling locations would continue.

Fluid

Surface exposures of hot springs are often places that are of cultural and religious importance to Native Americans. Exploration and development of geothermal resources in these areas may impact TCPs and be difficult to adequately mitigate.

Locatable

Maintaining the withdrawal of Lovelock Cave from locatable mineral development would continue to protect this NRHP-listed resource from disturbance and alterations of setting. Requiring additional stipulations for mineral operations within a mile of the CNHT or an identified TCP or within a quarter mile of NRHP-listed or NRHP-eligible cultural sites provides additional protection for cultural resources and consideration of Native American values. All alternatives recognize that a larger buffer area may be needed to avoid impacts on the setting of TCPs and avoiding interference with cultural practices.

RFDs

Based on reasonably foreseeable development scenarios, mineral exploration, development, and operations are expected to continue through the life of the RMP. Only a small proportion of the WDO that would be open to mineral exploration and development under any of the alternatives is expected to be subject to disturbance or further development. Alterations to setting could impact a larger area. Further cultural resource review at the different stages of exploration and development would avoid or address many potential impacts on cultural resources; however, there may be residual effects on cultural resources, TCPs, and the setting of the National Historic Trails that may be difficult or impossible to adequately mitigate.

Individual Effects under Alternative A

Current protections for cultural resources, TCPs, sacred sites, and National Historic Trails would be retained. No surface occupancy would be maintained for fluid and solid minerals for cultural and historical sites and visible remnants of National Historic Trails. Acreage subject to mineral withdrawals, closures, and surface use stipulations, which could reduce the risk of impacts on cultural resources, would be least under this alternative.

Individual Effects under Alternative B

While acreage open and closed to mineral material disposal would remain the same as under Alternative A, 867,124 acres would be open only to government entities and thus would be subject to additional stipulations to protect cultural resources. These measures would provide additional protection for cultural resources and consideration of Native American values from ground disturbance, erosion, setting intrusions, access leading to unauthorized collection or vandalism, and interference with traditional cultural uses and access.

Alternative B would increase the amount of land closed to leasing of fluid and solid leasables and also would add surface use stipulations. Allowing no surface occupancy within a mile of the CNHT, or an identified TCP considered eligible for the NRHP, or a quarter mile of cultural sites that are eligible for listing listed on the NRHP would provide additional protection for cultural resources and their settings and consideration of Native American values. Any quarter-quarter-quarter section (10-acre parcel) within or intersected by these site would be subject to no surface occupancy restriction.

Individual Effects under Alternative C

Alternative C includes more acres with cultural resource restrictions (closures, NSO stipulations, and mineral withdrawals) than all of the other alternatives and would provide the highest level of protection for cultural resources and consideration of Native American values among the alternatives.

Acreage closed to mineral material disposal and acres open only to government entities would increase. Lovelock Cave, Dave Canyon, Stillwater Mountains, and areas within a mile of identified TCPs known to be eligible or considered to be eligible for the NRHP would be closed to salable minerals. Alternative C would greatly increase the amount of land closed to leasing of fluid leasables and solid leasable, including land within a mile of the CNHT or an identified TCP considered eligible for the NRHP, or a quarter mile of cultural sites that are eligible for listing on the NRHP. Increasing the amount of land that would be withdrawn from locatable mineral leasing, including culturally sensitive areas, such as Stillwater Range, and an expansion of the buffer around Lovelock Cave, would provide additional protection for cultural resources and their settings and consideration of Native American values.

Individual Effects under Alternative D

Management measure would provide protections for cultural resources, TCPs, and National Historic Trails that are similar to those identified for Alternative C. This alternative includes fewer cultural resource restrictions and protective measures than under Alternative C but more than the other alternatives.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

Recreational use and access can impact cultural resources through direct disturbance, soil compaction, altered surface water drainage, erosion, intrusions to setting, and access leading to unauthorized collection or vandalism. The potential for impacts on cultural resources would increase as population and recreational use increases or is concentrated. The effect of repeated uses or visits over time could also increase the intensity of impacts due to natural processes. Continuing and enhancing interpretation and public education can vest the public in resource protection and respect for Native Americans and cultural values. Provisions for recreational permitting can reduce the potential for impacts from overuse. Updating the transportation plan and conducting site-specific NEPA analysis would be a federal undertaking, triggering further review of the potential impacts on cultural resources, TCPs, and trail segments.

Open OHV use can impact cultural resources, TCPs and trail segments through direct disturbance of site structure, artifact breakage and displacement, vandalism, soil compaction, altered surface

water drainage, erosion, creation of new routes and visual and aural intrusions to setting. Motorized access could facilitate access to any TCPs for cultural uses, but it could also increase the risk of impacts on resources from unauthorized collection or vandalism. Restricting vehicle use to existing routes would reduce the risk of disturbing cultural resources located off travel routes and would reduce some impacts on setting, but impacts from access could still occur. Enforcing travel routes is difficult, and unauthorized user-created trails would continue to occur, potentially impacting cultural resources. Closure of areas to OHV use provides the most protection for cultural resources, if access for cultural purposes can be maintained.

All alternatives include the following measures designed to avoid impacting cultural resources and Native American values:

- Maintaining and enhancing interpretive programs for cultural sites;
- Pursuing partnerships and agency coordination for interpretive sites;
- Ensuring that construction is compatible with landscape settings; and
- Minimizing adverse effects on cultural resources through use restrictions, permit stipulations, and mitigation measures.

Individual Effects under Alternative A

Under Alternative A, most of the WDO would remain open to OHV use, and there would be fewer limited and closed areas than under the other alternatives. Class I segments of National Historic Trails would remain open to OHV use, as would OCTA Class II, III, IV, and V segments of CNHT and trail viewsheds. The potential risk of impacts on archaeological sites, TCPs, and trail resources in these areas from direct disturbance, soil compaction, altered surface water drainage, erosion, intrusions to setting, and access leading to unauthorized collection or vandalism would continue and increase as population and use increases.

Individual Effects under Alternative B

By reducing the acres that would be open to OHV use and increasing limited and closed areas, potential impacts due to dispersed motorized recreation on cultural resources located off travel routes would be reduced from current levels. However, since over 1,460,200 acres would remain open to OHV use, many archaeological sites, the Lovelock Cave Backcountry Byway setting, National Historic Trails and associated setting, and TCPs and associated setting could be impacted. Designating SRMAs and RMZs for recreation could increase the intensity of use of these areas, increasing the risk of inadvertent and other damage to cultural resources and their setting. For example, the Blue Wing and Winnemucca Lake Playas RMZ is an important cultural resource area. Enhancing interpretive and educational opportunities as part of the recreation emphasis may help reduce inadvertent damage to cultural resources and Native American values present.

Individual Effects under Alternative C

By placing the most restrictions on OHV use, Alternative C would minimize the potential impacts on cultural resources and their setting from this recreational use. By limiting recreational facility development, emphasizing recreational opportunities closer to town over those in remote areas, and permitting fewer organized commercial and group activities, impacts on cultural resource sites would

be reduced and the potential intensity of impacts on cultural resources would be less dispersed and more localized.

Individual Effects under Alternative D

Potential impacts on cultural resources off travel routes would be reduced from current levels by restricting most vehicle use to designated routes. OCTA Class II, III, IV, and V segments of CNHT and trail viewsheds and TCPs would be protected by limited designation and Class I segments of National Historic Trails, and the area around Lovelock Cave would be protected by closure to OHV use.

Effects from Renewable Energy Management

Effects Common to All Alternatives

Renewable energy exploration and development (solar, wind, and biomass) activities are subject to further cultural resource review at each stage of development through the Section 106 in consultation with tribal governments. Potential impacts would include direct ground-disturbing activities, erosion, intrusions to setting, and access, leading to unauthorized collection or vandalism. The siting of wind energy facilities in particular can impact TCPs on mountain ridges and can affect the visual setting of the historic trails and other cultural resources. All permits would be subject to stipulations, restrictions, and mitigation measures, which would reduce the potential for impacts on cultural resources and TCPs.

Individual Effects under Alternative A

Impacts are the same as those identified for all alternatives. Existing exclusion zones would be maintained, providing protections for cultural resources and their settings.

Individual Effects under Alternative B

By not designating exclusion zones, current protection of cultural resources in those areas for consideration for renewable energy siting would be reduced, but impacts on cultural resources would still be considered in the Section 106 process.

Individual Effects under Alternative C

By increasing exclusion and avoidance zones, this alternative would place the most limitations on lands considered for development, thus minimizing potential impacts on cultural resources in those zones from the siting of renewable energy projects.

Individual Effects under Alternative D

By increasing exclusion and avoidance zones from current levels, Alternative D would limit the siting of renewable energy projects more than all of the alternatives except Alternative C and minimizing potential impacts on cultural resources in those zones.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Avoiding duplication of roads that have common destinations can reduce risks of impacts on cultural resources from ground disturbance and access leading to unauthorized collection or vandalism. Road maintenance such as plowing can disturb the physical integrity of cultural resources in road corridors where inventories are incomplete. However, maintenance can also prevent erosion and braiding and other processes that may threaten the integrity of cultural resources on or near roads. Roads can also alter the visual setting of cultural resources but can also facilitate access to any TCPs present for cultural uses.

Effects on cultural resources from OHV travel designations are discussed under Recreation, Visitor Outreach, and Services Management.

Individual Effects under Alternative A

Effects are similar to those identified for all alternatives.

Individual Effects under Alternative B

Identifying and decommissioning roads that are contributing to resource damage could reduce physical impacts on cultural resources. Creation of alternative access could result in additional impacts on cultural resources or could open up undisturbed areas to future impacts associated with use and access.

Individual Effects under Alternative C

Effects are similar to those described for Alternative B.

Individual Effects under Alternative D

Effects are similar to those described for Alternative B.

Effects from Lands and Realty Management

Effects Common to All Alternatives

All alternatives include provisions to retain and acquire lands that contain significant cultural resources and TCPs, to maintain access to resources, and to reduce unauthorized uses. The acquisition of new land would provide long-term federal protection to any cultural resources included in the transaction and could enhance currently managed resources by consolidating holdings and potentially protecting the setting of cultural resources. Land tenure adjustments that allow for better access to public lands could facilitate cultural use of TCPs but could also lead to vandalism or unauthorized collection of cultural resources. Exchange or disposal of lands to nonfederal entities would permanently remove federal protections for any significant cultural resources present, which would be an adverse effect on TCPs, and National Historic Trails segments. Adverse effects to most other cultural resources could be mitigated through data recovery. All National Historic Trails segments would be retained in compliance with Section 203(a) of FLPMA. Exchanges, disposal, and subsequent landscape changes could also result in impacts on the

setting of cultural resources, especially National Historic Trail resources. The setting of the Lovelock Cave Backcountry Byway could be adversely affected by disposal of land. Siting communication sites on mountaintops could impact Native American sacred sites and other TCPs and could affect the visual setting of the historic trails and other cultural resources. Defining exclusion and avoidance areas reduces the potential for impacts on cultural resources resulting from discretionary actions at those locations. Impacts on cultural resources from all lands and realty actions would be subject to further review.

Individual Effects under Alternative A

By providing a retention buffer for areas having high public resource values including the National Historic Trail, Alternative A is most protective of trail resources and the trail setting, as well as other cultural resources in the Humboldt River corridor. By defining 2,989,030 acres as suitable for disposal and by not designating avoidance areas or exclusion zones for lands and realty and ROWs, current management has the most amount of land that would be considered for activities that could impact cultural resources. Impacts on cultural resources may be mitigatable, but Alternative A is less protective of TCPs and other cultural resources that are difficult or impossible to mitigate.

Individual Effects under Alternative B

Because Alternative B would remove much of the retention buffer around the National Historic Trail, this alternative would reduce current protections of trail resources and the trail setting, as well as other cultural resources in the Humboldt River corridor. Fewer overall acres would be designated as suitable for disposal and avoidance areas would be increased resulting in less land that would be considered for activities that could impact cultural resources. Exclusion zones for lands and realty and ROW would be unchanged.

Individual Effects under Alternative C

Alternative C would provide more protection of National Historic Trail resources and settings than Alternative B, but less than Alternative A. Alternative C would provide the most protection for TCPs and other cultural resources that are difficult or impossible to mitigate by designating the least amount of land as suitable for disposal and by creating exclusion and avoidance zones. Land proposed to be transferred to the BIA would also retain federal cultural resource protections.

Individual Effects under Alternative D

The risk of impacts on cultural resources is similar to Alternative C, except that less land would be protected from disposal, designated as excluded, or avoided for discretionary actions.

Effects from ACEC/RNA Management

Effects Common to All Alternatives

Managing lands as ACEC or RNAs could directly or indirectly provide long-term protection of cultural resources by restricting incompatible uses. Protecting cultural and natural resource values in ACECs would also decrease the risk of impacts on identified or unidentified cultural resources present. Under all alternatives, the risk of impacts on cultural resources from ground-disturbing

activities, erosion, intrusions to setting, and access leading to unauthorized collection or vandalism would be reduced in these areas by restricting other actions.

Individual Effects under Alternative A

Effects are the same as those identified for all alternatives. Current protections for the 60-acre Osgood Mountain Milkvetch ACEC would also provide some additional protection of cultural resources within. By not creating any new ACECs, protection of cultural resources and places of Native American cultural and religious importance would not be addressed in the Pine Forest, Raised Bog, and Stillwater ACECs, which are proposed under Alternatives C and D.

Individual Effects under Alternative B

Effects are the same as those identified for Alternative A.

Individual Effects under Alternative C

By designating additional ACECs there would be fewer risks of impacts on cultural resources within the designated land from ground-disturbing activities, erosion, intrusions to setting, and access that would lead to unauthorized collection or vandalism. The creation of the Stillwater ACEC would provide additional protection for recognized locations important for contemporary Native American traditional and religious uses. Under Alternatives C and D, more land would be placed in ACECs and RNAs than the other alternatives, and there would be more restrictions on ground-disturbing and other activities, including communication sites that could impact cultural resources.

Individual Effects under Alternative D

Effects are the same as those identified for Alternative C.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

Segments of the CNHT follow the route of the Lovelock Cave Backcountry Byway. Lovelock Cave is listed on the NRHP and is one of the most important archaeological sites in the Great Basin. Efforts to preserve the setting of the cultural landscapes and viewshed associated with the trail and the cave are complementary to other cultural resource management measures. The Lovelock Cave Backcountry Byway includes a driving tour with historic (including National Historic Trails), prehistoric, and paleo-environmental interpretive stops and a nature trail with ethnobotanical stops. Continuing to manage and enhance the byway would continue to improve the visitor experience and would enhance public appreciation and protection of cultural resources. Developing additional backcountry byways could lead to more public interpretation of cultural resources, but it could also increase the risk of impacts on resources from unauthorized collection or vandalism.

Individual Effects under Alternative A

Effects are the same as those identified for all alternatives. Evaluation of the Gold Country, Silver, and Blue Lakes Byways under Alternatives A and D could lead to development of these in the future. The Gold and Silver BCBs include historic mining sites, and the Blue Lakes and Knott Creek

BCBs are in areas where prehistoric sites and Basque aspen carvings are found. Development of these could lead to interpretation of these cultural resources to the public.

Individual Effects under Alternative B

Effects are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative C

Effects are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative D

Effects are the same as those described for Alternative A.

Effects from National Trails Management

Effects Common to All Alternatives

National Historic Trails are cultural resources, and proposed management measures are described in the cultural resources section. Actions proposed to protect, interpret, and enhance the values of the trails and trail resources and to retain their setting are compatible and complementary with cultural resource protection.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no actions common to all alternatives that would impact cultural resources. No segments of rivers or streams are managed as wild and scenic rivers. If designations are pursued as called for under Alternative C, management measures could indirectly provide long-term protection of cultural resources by restricting consideration of incompatible uses along eligible segments.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

Managing 416,652 acres as WSAs to maintain wilderness characteristics would restrict surface-disturbing activities and would indirectly reduce the potential for direct disturbance of cultural resources, alterations to visual and aural setting, and access leading to vandalism and unauthorized collecting. Culturally important species and areas that are culturally significant to tribes may be protected, but there may also be loss of access to TCPs. If Congress releases the WSAs and they are not located within a designated ACEC, the risk of impacts on cultural resources from future surface-disturbing activities and other incompatible uses would increase.

Individual Effects under Alternative A

Effects are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative B

Effects are the same as those identified under Effects Common to All Alternatives.

Individual Effects under Alternative C

Effects are similar to those identified for all alternatives. Managing an additional 156,475 acres to protect wilderness characteristics in four areas includes closing them to mineral leasing and establishing ROW exclusion zones. Priority habitat would further restrict surface-disturbing activities and would reduce the potential for direct disturbance of cultural resources. Managing to maintain wilderness characteristics and priority habitat would also reduce the potential for indirect impacts on the visual and aural setting of cultural resources and would reduce the potential for impacts due to public access from overuse, vandalism and unauthorized collecting. Culturally important species and areas that are culturally significant to tribes may be protected, but there may also be loss of access to TCPs.

Individual Effects under Alternative D

Effects are the same as those identified under Effects Common to All Alternatives.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

Collecting information related to abandoned mines may contribute to understanding and future interpretation of historic mining resources. Safety considerations and hazard reduction could be in conflict with cultural resource and Native American values if historic structures and features are removed or modified, if clean up of hazards involve ground disturbance, or if access and use of culturally significant springs are limited without cultural resource review and Native American consultation.

Effects from Sustainable Development Management

Effects Common to All Alternatives

There are no actions common to all alternatives that would impact cultural resources. If sustainable development proposals are pursued under Alternatives B, C, and D, effects would be subject to further cultural resource review and would be similar to other land and realty actions. Disposal of public lands is allowed under all except Alternative A. Land reuse may prevent future land disturbance and impacts on cultural resources at other locations. While cultural resources would probably not be directly impacted, settings of National Historic Trails, TCPs, backcountry byways, and other cultural resources could be impacted. Reuse may continue alterations to the visual setting of cultural resources, or it could delay for several years the eventual reclamation and restoration of the visual setting.

Cumulative Effects

The types of effects on cultural resources that have occurred in the past include destruction of cultural resources, loss of integrity due to physical or other disturbances, loss of setting, the effects

of natural processes, such as erosion and weathering, incremental disturbance from use or access, loss of access to TCPs, and effects from vandalism and unauthorized collection.

Current and future trends include population growth, construction associated with urban development, access changes, and growth in recreation. These would continue to impact cultural resources and cultural landscapes through loss or disturbance of resources that are not protected, changes in setting, pressure from incremental use, loss of access to TCPs, and access leading to vandalism of cultural resources. Historic properties and the segments of National Historic Trails adjacent to areas of growth and development would be most susceptible to future impacts. Enforcement of measures designed to protect cultural resources and natural resources and places used by tribal groups would become more difficult as population and use increases. Areas where open, cross-country OHV use is allowed would continue to expose cultural resources to impacts. Designating routes can protect cultural resources located off the routes, but restrictions are difficult to enforce, especially as population and recreational use grows and other areas are closed. Actions related to grazing, vegetation treatment, wildland fire, mineral development, and energy development have had past effects on cultural resources. Use of natural resources and energy development is expected to remain at current levels or to increase.

Cultural resource and Native American values would continue to be considered and inventoried in the land tenure decisions and the acquisition and disposal of lands. In cases where resources are identified, mitigations to resolve adverse effects can preclude other desirable management options. Easier access through consolidation could facilitate better management of cultural resources and access to TCPs, but it also could lead to more impacts on cultural resources. Increased frequency of wildland fire in the cumulative effects area, allowing fire for resource benefit, and suppression are associated with surface and other disturbances to cultural resources. Treatments could affect plant resources utilized by Native Americans, increase health risks, and interfere with the use of certain areas for cultural practices during treatment. Inadvertent damage of uninventoried cultural resources could occur if control of prescribed fire is lost. The availability of natural resources used or valued by Native Americans could be affected by wildland fires, plant diseases, insect infestations, water developments, and interference from increased use or development.

For actions that could affect cultural resources on federal land or actions that are funded, licensed, or permitted by the federal government, compliance is required with the NHPA and other laws, statutes, and regulations. Consideration of the effects of undertakings on protected cultural resources would be required, and most adverse effects would be resolved. For many types of cultural resources, information on the regional cultural resource base is not available and needs to be developed to properly assess the significance of the resource base. State agency actions using federal funds or needing a federal permit require cultural resource review. Impacts on cultural resources would be avoided or mitigated in many of the regional actions. Some effects would be unavoidable. Measures are in place to identify threats to resources and to prioritize management actions, but some effects on known or unknown cultural resources resulting from activities such as natural processes, wildland fire, grazing, dispersed recreation, OHV use, and vandalism can go unnoticed and may not be mitigated. Mitigation could preclude other desirable management options and future uses. Development or actions on lands that are not protected by federal or other cultural resource statutes and regulatory protections could lead to loss of these resources and the regional heritage and knowledge that they contain.

Contributions to regional cumulative effects would vary among the alternatives. Alternative A would not change current management or provide additional protections for cultural resources. Alternative A would contribute to more regional cumulative effects resulting from open OHV use, land disposal, lack of avoidance and exclusion zones. Allowing open OHV use on most of the planning area and designating fewer limited and closed areas than under the other alternatives would continue ongoing impacts on cultural resources and their settings in the region. Although Alternative A defines over 3 million acres as suitable, buffers on ether side of the National Historic trail are protected from disposal, making this most protective of National Historic Trails as well as other cultural resources in the Humboldt River corridor. Most impacts to cultural resources are mitigatable, but Alternative A is less protective than the other alternatives of TCPs and other cultural resources that are difficult or impossible to mitigate. Fires would continue to be suppressed, reducing the potential impacts from wildland fire. For many of the other resources, fewer actions than those called for under the other alternatives would be taken that would provide additional protections for or enhancement of cultural resources. However, fewer impacts due to vegetation treatments would be expected. Maintaining a VRM Class II objective within six miles of the CNHT centerline would continue to set the highest objective among the alternatives.

The emphasis under Alternative B on resource use would contribute to new regional cumulative effects. While some proposed restrictions would result in additional protections for cultural resources, Alternative B would permit many activities in more places that would be incompatible with protecting cultural resources, TCPs, and Native American traditional practices. It would have the most effect on tribal uses, which are being limited by other regional trends and actions on private and public lands. Allowing fire for resource benefit is designated as suitable on over 111,000 acres and includes culturally sensitive areas containing a rich variety of unique and irreplaceable cultural resources. Changes in management of pinyon and juniper stands and expanding commercial uses would impact traditional uses and TCPs and would threaten the viability and continuity of these cultural traditions. Lands designated as VRM Class I or Class II would be less than under all of the other alternatives, and protection of the visual setting of cultural resources and historic landscapes would be reduced from current levels. Commercial development of water sources could lead to additional risk of impacts on cultural resources and traditional uses and values. Open OHV use would be reduced but still would encompass a large portion of lands managed by the WDO. By limiting OHV use in many areas to existing roads and trails, the likelihood of impacts on physical integrity and setting of archaeological sites, sacred sites, and TCPs off the roads would be reduced. For many of the other resources, additional protective and enhancing measures would be added that would reduce erosion of cultural resources, would improve habitat for culturally important species, would restore riparian and wetland areas, and would reduce wildland fire fuels. These treatments may be associated with some impacts and may include nonnative species. Fewer acres would be suitable for disposal, and avoidance areas for ROWs would be increased from current levels.

The emphasis of Alternative C on actions that value resource conservation, protection, and minimal human intervention would have the least impact or risk of impact on cultural resources and would contribute the least to cumulative effects. Alternative C designates the WDO as not suitable for allowing fire for resource benefit. Impacts due to fire suppression may occur on these lands. Alternative C would expand vegetation treatment from current levels, but impacts associated with the use of prescribed fire and chemical treatments would not occur. Promoting native plant communities through the use of native seed, more land resting, and natural recovery would improve

the setting of cultural resources and would restore plants and animals that may be important to tribal users. Treatments would also improve the preservation of surface cultural resource sites from loss of vegetated cover and wildland fire. Grazing impacts on cultural resources would be reduced or eliminated under Alternative C. Retaining and expanding restrictions on harvest of pinyon stands, Christmas tree cutting, firewood cutting, and green pinyon cutting would protect traditional cultural practices related to these tribal use areas. Protection of the visual setting of cultural resources, national trails, and historic landscapes would be increased from current levels. Lands designated as VRM Class I or VRM Class II objectives would be greater than all of the other alternatives. By placing the most restrictions on OHV use, Alternative C would minimize the potential impacts on cultural resources and their setting from this recreational use. Exclusions, restrictions, and withdrawal of lands from disposal, ROW and mineral development, surface disturbance, and other incompatible activities for natural or cultural resource protection would be highest under these alternatives and thus would contribute the least to regional cumulative effects on cultural resources.

Alternative D balances the conservation emphasis of Alternative C with more active management of resources and fewer restrictions on resources uses. Thus, cumulative impacts on cultural resources in the region would be more than under Alternative C and less than under Alternatives A and B. Allowing fire for resource benefit is designated as suitable on over 110,000 acres and includes culturally sensitive areas containing a rich variety of unique and irreplaceable cultural resources. By not designating areas as suitable or not suitable for allowing fire for resource benefit, decisions regarding allowing fire for resource benefit would continue to be made on a case-by-case basis in response to fires, perhaps resulting in impacts on cultural resources that may have otherwise been avoided. Allowing the BLM more discretion in managing pinyon stands may lead to fewer impacts on cultural resources from allowing fire for resource benefit than under Alternative C, but there could be more direct impacts from treatments and harvest of forest products. Careful use of treatments, protection of green pinyon, and selective harvest in consultation with tribal groups would help maintain the health of culturally important pinyon stands and the long-term pursuit of traditional practices. By emphasizing the use of native species for rehabilitation and reclamation, there would be less potential for impacts on historic settings and native gathering areas. Historic landscapes along CNHT would be managed to VRM objectives, based on an assessment of the actual scenic values present. By restricting most vehicle use to designated routes, potential impacts on cultural resources off travel routes would be reduced from current levels. Less land would be protected from disposal, be designated as excluded, be avoided for discretionary actions, be open to grazing, or be restored than under Alternative C. More land would be subject to stricter stipulations or mitigations for water importation or exportation projects, soil-disturbing activities, reclamation, and erosion control than under Alternatives A and B. Protections and enhancement of cultural resources and Native American uses on the substantial amount of land managed by the WDO would be improved from current conditions and, thus, would contribute less to cumulative impacts than all other alternatives except Alternative C.

4.2.14 Paleontological Resources

Summary

This section presents potential impacts of the alternatives on paleontological resources. The planning area has not been systematically surveyed for paleontological resources. However,

numerous paleontological localities have been identified by independent researchers. See Chapter 3 for a discussion of the paleontological resources in the planning area.

Some of the most important paleontological resources in the planning area include Mesozoic icthyosaurian fossils and Triassic hybodont shark remains. Fossil mammal and fish remains also occur in the planning area. The planning unit also includes a wealth of invertebrate paleontological resources, including flora fossils and several sources of paleoenvironmental information. The Lund Petrified Forest is a petrified wood paleoflora in Washoe County between Gerlach and Vya. Lands surrounding the Lund Petrified Forest have been withdrawn from mineral entry and also from use for disposal sites.

Assessment of potential effects on paleontological resources is addressed under FLPMA, NEPA, other federal regulations, and BLM orders. Pursuant to FLPMA, the BLM has issued regulations that provide additional protection. These regulations prohibit the removal of any scientific resource or natural object without authorization. There are exceptions to this prohibition for small quantities of common invertebrate fossils and petrified wood. The BLM manages paleontological resources for their scientific, educational, and recreational values and to ensure that any impacts are mitigated.

Impacts on paleontological resources occur by erosion, OHVs, excavation, theft, vandalism, and surface-disturbing activities, such as trampling by animals and humans. Experience has shown that damage, theft, and vandalism are usually concentrated near roads and trails. Impacts on paleontological resources may increase because of additional visitation to the areas containing these resources.

Overall, objectives and actions associated with other resources that result in closure to surface disturbance activities would have beneficial impacts (less chance of disturbance) to any paleontological resources that might be present. These other objectives and actions are referenced below.

Methods of Analysis

Methods and Assumptions

This analysis is based on information compiled by a BLM contractor, paleontologist David Lawler (Lawler 1978; Lawler and Roney 1978), as well as from reports by J. R. Firby (Firby 1995), Jefferson (no date) and other researchers.

The following assumptions regarding the resource base and management practices were considered in the analysis:

- For the purpose of assessing impacts, only those objectives and actions potentially affecting vertebrate and scientifically important paleontological resources were considered;
- The greatest potential for impacts would result from actions that include direct large-scale disturbance of bedrock, weathered bedrock, or unconsolidated alluvial deposits that may include fossils of more recent geologic age;
- All authorized surface-disturbing activities include assessment of paleontological resources in project area and sufficient mitigation to reduce impacts on those resources;

- Excavation can reveal previously undiscovered resources and potentially allow research and interpretive uses;
- While paleontological resources are often discovered only through being exposed by erosion, exposed fossils or scientifically important paleontological resources can be damaged by wind and water erosion. Other sources of damage include animal and human intrusion, natural deterioration, and development and maintenance activities;
- Increased access associated with new development and increased recreation use leads to increased access to paleontological sites;
- Vandalism and unauthorized collecting can destroy a feature or remove it from its context and availability for scientific study; and
- Public education increases public appreciation and awareness of the need for protection, but publication of specific locations leads to increased visitation.

The area of analysis for cumulative effects on paleontological resources is defined as northwestern Nevada.

Effects from Air Quality Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from air quality management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Geology Management

Effects Common to All Alternatives

Paleontological resources or impacts are not managed as unique geologic resources. Even though they are managed separately, any unknown paleontological resources within the boundaries of areas protected as unique geologic features would also be protected. For example, one of the geologic resources being considered to be potentially unique includes Lake Lahontan shore features (e.g., gravel bars or shore terraces). These features could include paleoenvironmental information. Should any examples of the Lake Lahontan shore features be designated as a unique geologic feature, any paleoenvironmental information present would also be preserved.

Individual Effects under Alternative A

Other than maintaining current OHV use within exclusion zones, there are no set management objectives or actions under Alternative A concerning unique geologic resources. Mitigations and restrictions are determined on a case-by-case basis.

Individual Effects under Alternative B

Regarding mining activities, unique geologic resources would be protected less under Alternative B than under Alternative A, where individual cases may include stronger limitations or mitigations. Regarding OHV use, limitations under Alternative B would be greater than those under Alternative A, less than those under Alternative C, and equivalent to those under Alternative D. Any unknown

paleontological resources within the areas protected as unique geologic features would also be protected.

Individual Effects under Alternative C

Regarding mining activities, the protection of the unique geologic resources would be greatest under Alternative C. Regarding OHV use, limitations under Alternative C would be greater than those under Alternatives A, B, and D. Any unknown paleontological resources within the areas protected as unique geologic features would also be protected.

Individual Effects under Alternative D

Regarding mining activities, the protection of the unique geologic resources would be overall less than under Alternative C, where all mining activities would be restricted, but protection would be greater than under Alternatives A and B. Regarding OHV use, limitations under Alternative D would be greater than those in Alternative A, less than those under Alternative C, and equivalent to those under Alternative B. Any unknown paleontological resources within the areas protected as unique geologic features would also be protected.

Effects from Soil Resources Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from soil resources management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Water Resources Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from water resources management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Forest/Woodland Products Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from forest or woodland products management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Weeds Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from weeds management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Chemical and Biological Control

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from chemical and biological control management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Rangeland Management

Effects Common to All Alternatives

Soft marshy areas can contain deposits of paleoenvironmental resources (e.g., pollen). The management objectives and actions under rangeland management would result in various numbers of livestock in these types of areas. These areas could experience increased erosion, resulting in the loss of the paleoenvironmental information if such paleontological resources were not known to be present and otherwise protected.

Other than potential damage to undiscovered paleontological resources, there are no likely impacts on paleontological resources resulting from rangeland management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Vegetation—Riparian and Wetlands Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from riparian and wetlands management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Fish and Wildlife Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from fish and wildlife management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Special Status Species Management

Effects Common to All Alternatives

If unknown paleontological resources were present within the boundaries of areas protected from surface disturbances due to special status species management, resources would also be protected. If not, there are no likely impacts on paleontological resources resulting from special status species management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Wild Horse and Burro Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from wild horse and burro management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Wildland Fire Management

Effects Common to All Alternatives

Allowing fire for resource benefit and fire suppression can involve ground-disturbing activities at depths that can directly affect any undiscovered paleontological resources, if present. These actions include constructing fire lines, bulldozing access roads, and using heavy equipment. High severity fire can also damage surface fossils, including cracking, spalling, and oxidizing. Fire can result in impacts through erosion and the increased visibility of paleontological resources. Fire can also remove vegetation and expose previously undiscovered resources, allowing for their discovery, study and protection; however, locations exposed by fire can be susceptible to damage by subsequent erosion, vandalism, and unauthorized collecting.

Impacts on undiscovered paleontological resources cannot be assessed because the type, quality, and location of the resources are unknown. Given that the location of any surface-disturbing activities cannot be predicted, the intersection of the undiscovered resources and the potential future activities also cannot be predicted. There are no likely impacts on known paleontological resources locations resulting from wildland fire management objectives or actions under any of the alternatives. With respect to effects on known paleontological resources, all of the alternatives are essentially equivalent.

Effects from Cultural Resources Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from cultural resource management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Tribal Consultation Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from tribal consultation objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Paleontological Resources Management

Effects Common to All Alternatives

Beneficial impacts on paleontological resources are anticipated. Measures under all of the alternatives call for an inventory of areas that may contain paleontological resources before land use authorizations. Alternatives B, C, and D also include additional protective management measures to

identify priority geographic areas for field inventory and to develop management recommendations (including mitigation measures) to protect any identified resources on a case-by-case basis. These measures would increase the identification of previously unknown paleontological resources, allowing them to be protected from disturbance and reducing potential for impacts.

Permits would be required to remove fossils for scientific purposes. As appropriate, physical conservation measures, such as signing, fencing, erosion control, and administrative conservation. would be implemented to reduce impacts on the resources. In addition, law enforcement would patrol selected areas to help prevent damage to or theft of paleontological resources.

Collecting fossils from within the George W. Lund Petrified Forest would be prohibited, thereby increasing the level of protection and reducing the current impacts.

Education opportunities would be promoted and partnerships with academic and scientific organizations would be pursued. Materials would be published to promote public awareness and appreciation of the WDO paleontological resources. Scientific research information concerning the locations of specific resources would be published only if increased visitation would not harm the resource.

Individual Effects under Alternative A

Under Alternative A, there would be no additional management objectives or actions other than those common to all of the alternatives. Alternative A is equivalent to Alternative B.

Individual Effects under Alternative B

Under Alternative B, there would be no additional management objectives or actions other than those common to all of the alternatives. Alternative B is equivalent to Alternative A.

Individual Effects under Alternative C

While physical conservation measures, such as signing, fencing, erosion control, and administrative conservation, would be implemented under all of the alternatives, under Alternative C, these measures would not be implemented if they could result in increased visitation. Other actions, including withdrawing land, closing public access, and prohibiting OHV use, would be used to protect vulnerable paleontological deposits from disturbance and to reduce the potential for impacts.

While all alternatives would seek to publish materials to promote public awareness and appreciation of the WDO paleontological resources, Alternative C would limit publication to those materials that would not result in increased visitation and the resulting increase in vandalism and unauthorized collecting. The protections of paleontological resources are greatest under Alternative C. Therefore, Alternative C would result in the fewest impacts on paleontological resources.

Individual Effects under Alternative D

Under Alternative D, other actions, including withdrawing land, closing public access, and prohibiting OHV use, would be used as appropriate to protect vulnerable paleontological deposits from disturbance, thereby reducing the level for impacts. The protection of paleontological

resources under Alternative D is greater than those under Alternatives A and B and less than those under Alternative C.

Effects from Visual Resources Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from visual resources management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Cave and Karst Resources Management

Caves frequently contain pack rat middens, which are an important source of paleoenvironmental information.

Effects Common to All Alternatives

Increased visitation would result in a greater risk of impacts from disturbance, vandalism, and unauthorized collecting as access is improved and locations become known.

Individual Effects under Alternative A

There are no objectives or management actions under Alternative A, and any protections would be on a case-by-case basis.

Individual Effects under Alternative B

Caves frequently contain pack rat middens, which are an important source of paleoenvironmental information. Alternative C are most protective; Alternatives B and D provide similar protections.

Alternative B includes actions for identifying caves, for implementing appropriate mitigation measures, such as seasonal closures, avoidance, fencing, bat gates, and installing signs to protect the unique geologic features and wildlife habitat. These mitigations would also reduce the potential for disturbance of pack rat middens. Alternative B includes greater protections for cave resources (e.g., closures and physical barriers) than Alternative A. The education and public awareness provisions would increase visitation to those areas, resulting in a greater risk of impacts from disturbance, vandalism, and unauthorized collecting as access is improved and locations become known.

Individual Effects under Alternative C

Alternative C includes actions for identifying caves, for implementing appropriate mitigation measures, such as seasonal closures, avoidance, fencing, bat gates, and installing signs to protect the unique geologic features and wildlife habitat. These mitigations would also reduce the potential for disturbance of pack rat middens. Alternative C includes greater protections for cave resources (e.g., closures and physical barriers) than does Alternative A and have essentially equivalent protections as Alternative B. However, under Alternative C, the education and public awareness provisions would be limited to those that would not increase visitation and would involve less risk of impacts from disturbance, vandalism, and unauthorized collecting than under Alternatives B and D.

Individual Effects under Alternative D

Alternative D includes actions for identifying caves, for implementing appropriate mitigation measures, such as seasonal closures, avoidance, fencing, bat gates, and installing signs to protect the unique geologic features and wildlife habitat. These mitigations would also reduce the potential for disturbance of pack rat middens. Alternative B includes greater protections for cave resources (e.g., closures and physical barriers) than does Alternative A. The education and public awareness provisions would increase visitation to those areas, resulting in a greater risk of impacts from disturbance, vandalism, and unauthorized collecting as access is improved and locations become known.

Effects from Livestock Grazing Management

Effects Common to all Alternatives

The areas around springs can be either erosional or depositional. Where there are seasonal deposits of sediments around springs, these deposits can contain pollen or other paleoenvironmental materials. Disruption of these seasonal depositions impacts the scientific value of these materials.

Grazing animals tend to congregate in riparian areas including springs. Potential impacts of grazing include increased sediment loading from soil eroded by wind and water due to vegetation loss, direct soil disturbance, and runoff concentrated into animal trails, with consequent enhanced erosion. Spring developments and livestock concentrations in the vicinity of springs could effect any deposition in the area of springs, so potential deposition of paleoenvironmental materials could also be effected reducing the scientific value of these materials.

With the exception of Alternative C, Option 2, which would eliminate livestock grazing, livestock grazing under all of the alternatives is expected to continue to have impacts on water resources, including springs. The information and analysis regarding these impacts mostly concern water quality. There is little information on the effects on the depositional nature of springs.

Under each of the alternatives (except Alternative C, Option 2), 399,073 AUMs of livestock forage would be allocated, subject to adjustment based on monitoring (and on other criteria in the case of Alternative C).

Individual Effects under Alternative A

Alternative A attempts to strike a balance between livestock grazing and other uses, minimizing conflicts between livestock and other uses.

Closure to grazing is one of the most effective methods of preventing adverse effects on water resources. Alternative A closes 296,008 acres to livestock grazing, which is the same as Alternative B, about 2,000 fewer acres than under Alternative C Option 1, and about 23,000 fewer acres than under Alternative D. Therefore, Alternatives A and B would result in more of the types of impacts on springs and the paleoenvironmental deposits described above than would Alternatives C ,Option 1, and D.

Alternatives A and B, and to a lesser extent Alternative D, allow continued development of new springs and wetland-riparian areas for livestock watering with constraints. The development of these

new watering sources would allow animals to be rotated among a greater number of sites and would allow more opportunity for disturbed sites and the paleoenvironmental deposits to rest and recover.

Individual Effects under Alternative B

Alternative B designates the same number of acres closed to grazing as does Alternative A.

The development of new springs to support livestock grazing is the same as that under Alternative A and is intended to minimize impacts on water resources and the paleoenvironmental deposits.

Individual Effects under Alternative C

Alternative C, Option 1

Alternative C, Option 1 calls for closing about 2,000 more acres to grazing than Alternative A, so it would be slightly more protective of springs and the paleoenvironmental deposits.

Alternative C, Option 1, would not allow new spring developments to support livestock grazing. This would effectively result in a phaseout or reduction in grazing in some allotments. The measure may not be protective of undeveloped springs, but other actions described above give rangeland managers broad authority to limit impacts on undeveloped springs and any paleoenvironmental deposits.

Option 1 calls for restoring or developing springs to benefit wildlife, rather than livestock. No new springs would be developed to support livestock, and newly developed springs would be fenced to exclude livestock and WHB. The combination of these actions is expected to reduce impacts on springs and the paleoenvironmental deposits to a greater extent than under Alternative B.

Alternative C, Option 2

Alternative C, Option 2 excludes grazing, which would reduce impacts on springs and the paleoenvironmental deposits.

Individual Effects under Alternative D

Alternative D would close about 23,000 acres more to grazing than would Alternative A. Closure provides the highest level of protection to springs and the paleoenvironmental deposits.

Alternative D is similar to the corresponding action under Alternatives A and B, however, under Alternative D, there is more explicit guidance than under Alternatives A and B on how new spring or wetland-riparian water developments should be installed.

Effects from Minerals Management

Effects Common to All Alternatives

If present, paleontological resources could be impacted by the extent and depths of ground disturbance associated with salable and locatable mineral development. However, the potential for paleontological resources would be assessed before these activities were authorized, and avoidance or mitigations would be required.

Individual Effects under Alternative A

Under Alternative A, 418,938 acres would be closed to salable mineral disposition, 446,887 acres would be closed to fluid leasable minerals activities, 416,652 acres would be closed to solid leasable minerals activities, and 6,543 acres would be withdrawn from locatable mineral activities. Paleontological resources would be protected from these mining activities within these areas, thereby reducing the potential for impacts from disturbance. Under Alternative A, fluid minerals leasing would only be allowed within the Raised Bog area with NSO stipulations.

Individual Effects under Alternative B

Under Alternative B, 418,938 acres would be closed to salable mineral disposition, 1,132,594 acres would be closed to fluid leasable minerals activities, 1,124,266 acres would be closed to solid leasable minerals activities, and 6,543 acres would be withdrawn from locatable mineral activities. Paleontological resources would be protected from mining activities within these areas, thereby reducing the potential for impacts from disturbance. Alternative B includes the same amount of land closed to the various mining activities, except for solid leasable minerals activities. For these minerals activities, more area would be closed under Alternative B than under Alternative A.

Under Alternative B, there are no restrictions on mining within the Raised Bog area.

Individual Effects under Alternative C

Under Alternative C, 837,049 acres would be closed to salable mineral disposition, 4,455,028 acres would be closed to fluid leasable minerals activities, 4,453,645 acres would be closed to solid leasable minerals activities, and 281,892 acres would be withdrawn from locatable mineral activities. Paleontological resources would be protected from these mining activities within these areas, thereby reducing the potential for impacts from disturbance. More land would be closed to the various types of mining activities under Alternative C than under Alternatives A, B, or D.

In addition, the area of the George Lund Petrified Forest withdrawal would be enlarged to a total of 141 acres, further reducing potential impacts on paleontological resources from disturbance associated with mining activities.

Individual Effects under Alternative D

Salable mineral activities and fluid and solid leasable minerals activities would be allowed within one quarter mile of an identified paleontological resource classified as being of scientific or educational interest. To accomplish this, any quarter-quarter-quarter section (10-acre parcel) within or intersected by the site or the quarter-mile buffer line would be subject to NSO.

Under Alternative D, 743,301 acres would be closed to salable mineral disposition, 1,98,464 acres would be closed to fluid leasable minerals activities, 1,198,694 acres would be closed to solid leasable minerals activities, and 27,941 acres would be withdrawn from locatable minerals activities. Paleontological resources would be protected from mining activities within these areas, thereby reducing the potential for impacts from disturbance. More land would be closed to the various types of mining activities under Alternative D than under Alternatives A or B but less land than under Alternative C.

The rights to locatable minerals could be acquired, but proposals for locatable mineral operations would be restricted within a quarter mile of identified paleontological resources classified as being of scientific or educational interest.

In addition, the area of the George Lund Petrified Forest withdrawal would be enlarged to a total of 141 acres, further reducing potential impacts on paleontological resources from disturbance associated with mining activities.

Effects from Recreation, Visitor Outreach, and Services Management

Effects Common to All Alternatives

OHV use can damage surface manifestations of paleontological resources, if present, and can increase access to localities. Increased access increases the potential for disturbance and unauthorized collection.

Individual Effects under Alternative A

Alternative A closes more acres to OHV use than does Alternative B but closes less than under Alternatives C and D. However, Alternative A does not include limits on OHV use in other areas.

Individual Effects under Alternative B

Alternative B closes the least acreage to OHV use but applies limits to OHV use on a large amount of land.

Individual Effects under Alternative C

Alternative C calls for closing the most land to OHV use and the most land with limits applied to OHV use.

Individual Effects under Alternative D

Alternative D closes more land to OHV use and applies limits to OHV use on more land than does Alternative B but less than under Alternative C.

Effects from Renewable Energy Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from renewable energy management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Transportation and Access Management

Effects Common to All Alternatives

Increased transportation or access to any area would increase the level of visitation, resulting in greater potential for impact on any paleontological resources that might be present. There are no likely specific impacts on known paleontological resources resulting from transportation and access

management objectives or actions under any of the alternatives. With respect to effects on known paleontological resources, all of the alternatives are essentially equivalent.

Effects from Lands and Realty Management

Effects Common to All Alternatives

Paleontological resources would be one of the public resources evaluated when acquisition actions are considered. The acquisition of new land would provide long-term federal protection of any paleontological resources contained therein.

Exchange or disposal of lands to nonfederal entities would permanently remove federal protections for paleontological resources. The reduced level of protection would result in greater potential for vandalism, theft, and destruction of any paleontological resources present. The potential for paleontological resources would be assessed before these activities were authorized.

No specific lands with known paleontological resources have been identified for acquisition or disposition, so there are no likely impacts on paleontological resources resulting from lands and realty management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from ACEC/RNA Management

The Raised Bog is considered to have potential to have a 10,000-year-old pollen record.

Effects Common to All Alternatives

Surface disturbance could disturb the more recent paleoenvironmental information and could increase erosion, which could result in the loss of older information.

Individual Effects under Alternative A

Under Alternative A, the Raised Bog area is not proposed for ACEC designation. Any protections would continue on a case-by-case basis (see Effects from Minerals Management). The protections under Alternative A are slightly greater than those under Alternative B.

Individual Effects under Alternative B

Under Alternative B, the Raised Bog area is not proposed for ACEC designation. There would be no surface disturbance restrictions. Alternative B is the least restrictive alternative.

Individual Effects under Alternative C

Under Alternative C, the Raised Bog area is proposed for ACEC designation. This would increase the restrictions on surface disturbance activities. Alternatives C and D are equally restrictive.

Individual Effects under Alternative D

Under Alternative D, the Raised Bog area is proposed for ACEC designation. This would increase the restrictions on surface disturbance activities. Alternatives C and D are equally restrictive.

Effects from Backcountry Byways Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from backcountry byways management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from National Trails Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from national trails management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Wild and Scenic Rivers Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from wild and scenic rivers management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Wilderness Study Areas and Lands with Wilderness Characteristics Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from wilderness, wilderness study areas, or areas with wilderness characteristics management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Watchable Wildlife Viewing Sites Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from watchable wildlife viewing sites management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Public Health and Safety Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from public health and safety management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Effects from Sustainable Development Management

Effects Common to All Alternatives

There are no likely impacts on paleontological resources resulting from sustainable development management objectives or actions under any of the alternatives. With respect to effects on paleontological resources, all of the alternatives are essentially equivalent.

Cumulative Effects

Increased regulation and increased protection of other resources would result in less area subject to surface-disturbing activities and activities that result in increasing potential for erosion. These changes would result in less general damage to paleontological resources and increased protection of specific identified resources.

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