CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter evaluates potential environmental impacts that could occur from implementing each of the Resource Management Plan (RMP) alternatives described in Chapter 2. Potential impacts considered in this chapter include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, and health impacts (40 Code of Federal Regulations [CFR] §1508.8). The baseline used to determine the potential impacts is the current resource condition described in Chapter 3.

4.1.1 Organization of Chapter 4

The analysis is organized by resource program and discloses the potential impacts on each resource program from implementing each of the proposed alternatives. Although a resource or resource use is not specifically identified, the impacts from these are discussed. For example, vegetation treatments are proposed under soil resources, water resources, vegetation, and livestock grazing management decisions; however, the impacts from vegetation treatments are referred to collectively. Similarly, in the alternatives, restrictions are placed on oil and gas leasing by a number of resources, such as areas of environmental concern (ACECs), non–Wilderness Study Area (WSA) lands with wilderness characteristics (WC areas), special status species, and fish and wildlife resources. However, where possible, the impacts that would result from these restrictions are grouped and addressed collectively.

The impact analysis for Alternative A (No Action) was prepared first to serve as the baseline for comparison of the alternatives. Impacts resulting from management actions common to all alternatives are addressed in a separate subsection to reduce redundancy in the analysis. The introductory section of each resource program establishes the scope of the analysis and describes the general types of impacts discussed in the analysis, and presents the assumptions associated with that resource program that were used throughout the analysis. Impacts on each resource program from each alternative are grouped by impact type. Following analysis of each alternative, a summary of the major differences among the alternatives is presented, as well as disclosure of potential irreversible and irretrievable commitment of resources, unavoidable impacts, and the relationship between local, short-term uses and long-term productivity. The chapter concludes with a discussion of cumulative impacts, organized by resource program.

4.1.2 Types of Impacts

The following analysis focuses on identifying types of impacts and estimating their potential effects on the resources, resource uses, special designations, and support programs. This chapter uses the terms *impacts* and *effects* interchangeably and the terms *increase* and *decrease* for comparison purposes. The terms used to describe impacts are presented in Table 4-1. Cumulative impacts and methodologies used in the cumulative analysis are discussed in Section **4.6**.

Table 4-1. Types of Impacts

Type	Description
Direct Impacts	Effects that are caused by the action and occur at the same time and place. Examples include elimination of original land use through erection of a structure. Direct impacts may cause indirect impacts, such as ground disturbance resulting in suspension of dust.

Type	Description
Indirect Impacts	Effects that are caused by the action but occur later in time or are farther removed in distance, yet are still reasonably foreseeable and related to the action by a chain of cause and effect. Indirect impacts may reach beyond the natural and physical environment (e.g., environmental impact) to include growth-inducing effects and other effects related to induced changes in resource users (e.g., social impact).
Cumulative Impacts	Effects that result from the incremental impact of the action when it is added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time.

This analysis considers the context, intensity, and duration of an impact. *Context* relates to environmental circumstances at the location of the impact and in the immediate vicinity, affected interests, and the locality. *Intensity* refers to the severity or extent of the impact or magnitude of change from existing conditions. *Duration* refers to the permanence and longevity of the impacts, which is described as short term or long term. *Short term* is defined as anticipated to end within the first 5 years after the action is implemented. *Long term* is defined as lasting more than 5 years after the action is implemented, or beyond the planning time frame addressed in the RMP.

For ease of reading, impacts presented are direct, broad (occurring within the decision area), and long term, unless otherwise noted as indirect, localized, or short term/temporary. Potential significant impacts are also identified in the impact analysis. Because an impact may be perceived as beneficial or adverse, these terms are not used in defining impacts.

4.1.3 General Analytical Assumptions

Several assumptions were made in the analysis regarding level of land use activity, resource condition, and relationships between resources. Potential impacts and their significance were determined based on these assumptions. The following general assumptions were used in the analysis; additional assumptions are presented under each resource topic, but apply to the analysis as a whole:

- Management actions proposed in the alternatives apply to public lands only.
- The impact analysis applies only to the decision area; however, the cumulative impact analyses consider potential actions on affected resources/uses regardless of ownership and administration and beyond the planning area boundaries.
- The alternatives would be implemented over the life of the plan in accordance with laws, regulations, and standard management guidelines.
- Funding would be available to fully monitor and implement the management actions as described in Chapter 2.
- BLM policies, including *Standards for Rangeland Health* and *Guidelines for Grazing Management for BLM Lands in Utah* (Standards and Guidelines), would be applied as appropriate across all alternatives. These would assess rangeland health and provide strategies to achieve desired resource conditions and management objectives.
- Best management practices (BMPs) are tools that would minimize or mitigate site-specific impacts on resources, and would be applied and adjusted on a case-by-case basis.
- Mitigation requirements would prevent or limit direct impacts associated with land use activities or would reclaim the land after the activity has been completed.
- Projected levels of activity for land use would change based on historical trends, existing land use authorizations such as leases or permits, and statements of interest in land use by individuals and industry organizations.

- Public land users would comply with the decisions and allocations contained in the alternatives.
- Actions associated with emergency or public safety would be performed at the discretion of the Authorized Officer.
- All acreages and percentages presented in this chapter pertain to the entire decision area unless otherwise stated.

4.1.4 Determining Significance of Impacts

Determining significance is complex, particularly at the RMP planning level. The significance of a resource or impact is dynamic and may change during the planning period. Significance can be real and supportable by fact, or perceived and perhaps not fully supportable even with rigorous study. For this analysis, the approach to establishing significance was based on legal issues, public perception, and professional judgment. The significance of the impacts of implementation-level decisions will be determined on the basis of more site-specific analysis and further consideration of the context and intensity of impacts, as explained in the Council on Environmental Quality's (CEQ) Significance Criteria found in the Code of Federal Regulations at 40 CFR 1508.27.

4.1.5 Critical Elements

The BLM *National Environmental Policy Act (NEPA) Handbook* (H-1790-1) requires that all environmental impact statements (EIS) address certain topics, which the BLM refers to as Critical Elements of the Human Environment. The list of critical elements in the BLM handbook has been expanded by BLM Instruction Memoranda and by Executive Orders (EO). These elements are presented in Table 4-2 in the order in which they appear in Chapters 2, 3, and 4, followed by corresponding Relevant Authorities and the status of the critical element in this document.

Table 4-2. Critical Elements

Critical Element	Relevant Authority	Status
Air Quality	The Clean Air Act as amended (42 U.S.C. 7401 et seq.)	Addressed in its own section of the EIS
Farm Lands (prime or unique)	Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.)	As noted in the soils section in Chapter 3, none are present in the decision area; therefore, not addressed in Chapter 4
Water Quality (Drinking/Ground)[1]	Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq.) Clean Water Act of 1977 (33 U.S.C. 1251 et seq.) Colorado River Basin Salinity Control Act of 1974, as amended	Addressed in the Water Resources section
Floodplains	EO 11988, Floodplain Management	Addressed generally in water section (No projects or activities are proposed in the RMP that would result in diversions in or placement of permanent facilities on active floodplains of major rivers)
Wetlands/Riparian Zones	EO 11990, Protection of Wetlands	Addressed in the Vegetation section

Critical Element	Relevant Authority	Status
Invasive, Non-Native Species[1]	Federal Noxious Weed Act of 1974, as amended Endangered Species Act of 1973, as amended EO 13112, Invasive Species	Addressed in the Vegetation section
Threatened or Endangered Species	Endangered Species Act of 1973 as amended (16 U.S.C. 1531)	Addressed in its own section of the EIS
Cultural Resources	National Historic Preservation Act as amended (16 U.S.C. 470)	Addressed in its own section of the EIS
Areas of Critical Environmental Concern	Federal Land Policy and Management Act of 1976 [FLPMA] (43 U.S.C. 1701 et seq.)	Addressed in its own section of the EIS
Wild and Scenic Rivers	Wild and Scenic Rivers Act as amended (16 U.S.C. 1271)	Addressed in its own section of the EIS
Wilderness	FLPMA and Wilderness Act of 1964 (16 U.S.C. 1131 et seq.)	Addressed in its own section of the EIS
Environmental Justice[1]	EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Addressed in the Social and Economic section
Native American Religious Concerns	American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996) EO 13007, Indian Sacred Sites	Addressed in the Social and Economic section
Wastes (Hazardous or Solid)	Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.) Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended (42 U.S.C. 9615)	Addressed in the Social and Economic section
[1]Critical element added by IM-1999-178 [Interim Guidance—Changes to the List of Critical Elements of the Human Environment in the BLM *National Environmental Policy Act (NEPA) Handbook*		

Source: BLM H-1790-1, Appendix 5

4.1.6 Incomplete or Unavailable Information

CEQ regulations implementing the National Environmental Policy Act (NEPA) require agencies evaluating effects on the human environment in an environmental impact statement (EIS) to identify incomplete or unavailable information, if that information is essential to a reasoned choice among alternatives (43 CFR 1502.22).

As is typical in programmatic planning efforts, site-specific data is used to the extent possible and may not be entirely available; however, this data is not essential for a reasoned choice among alternatives. The best available information pertinent to management actions was used to develop this Draft RMP/EIS. Considerable effort has been made to acquire and convert resource data into digital format for use in the plan—both from BLM sources and from outside sources. However, certain information was unavailable for use in developing this plan, usually because inventories have not been conducted or are not complete. Some of the major types of unavailable data are the following:

- Air Quality baseline data within the decision area
- Detailed soil surveys throughout the decision area (should be completed within the planning period, including characteristics to help determine fragile soil characteristics)

- Field inventories for some wildlife and special status species occurrence, condition, and trend
- Complete inventories for cultural and paleontological resources
- Native American traditional use areas
- Inventory of abandoned mines
- Direct recreation visitation based on actual use and economic expenditure data associated with such use.

For these resources, estimates were made regarding the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified given the proposed management actions. Where such a gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent implementation-level and project-level analysis will provide the opportunity to collect and examine site-specific inventory data required to determine appropriate application of the RMP guidance. In addition, ongoing inventory efforts by the BLM and other agencies continue to update and refine the information used to implement this plan.

Potential impacts of certain land use activities can be compared visually and numerically among the alternatives by using geographic information system (GIS) data. Due to differences in the level of detail between GIS datasets, small errors in acreage calculations and analysis overlays can occur. To reduce the potential for such errors and resulting inconsistencies within the analysis, acreage figures were rounded according to a graduated scale. As such, acreage calculations used in this analysis are approximate projections used for comparison of alternatives and analytic purposes only; they do not reflect exact measurements of on-the-ground resources and actions.

4.2 RESOURCES

4.2.1 Impacts on Air Quality

This section presents the impacts on air quality from management actions for the resources and resource uses discussed in Chapter 2. Existing conditions concerning air quality are described in Chapter 3.

A qualitative emission comparison approach was selected for the Kanab RMP analysis of impacts on air quality. This approach was selected because of uncertainties about the number, nature, and specific location of future sources and activities. The emissions calculations were based on the best available engineering data and assumptions, on air, visibility, and emission inventory procedures, and on professional and scientific judgment. However, assumptions were used when specific data or procedures were unavailable. A general statement about National Ambient Air Quality Standards (NAAQS) and Utah Ambient Air Quality Standards can be made for this qualitative analysis. This emission comparison approach is defensible and provides a sound basis for comparing baseline air quality emissions with those expected to be produced from the alternatives.

Maximum potential near-field particulate matter (PM) emissions from traffic on unpaved roads and well pad construction were used to estimate emissions for $PM_{2.5}$ and PM_{10} impacts. Maximum air pollutant emissions from each gas well would be temporary (i.e., occurring during a 12-day construction period) and would occur in isolation, without significantly interacting with adjacent well locations. PM emissions from well pad and road maintenance and construction would be minimized by applying water and/or chemical dust suppressants. The control efficiency of these dust suppressants was computed at 50 percent during construction.

For any future project, potential air quality impacts will include local, state, tribal, and federally enforced legal requirements to ensure that site-specific activities do not generate emissions that contribute to an exceedance of the NAAQS, Prevention of Significant Deterioration (PSD) increments, or other regulatory standards.

A direct relationship between emissions and visibility impairment does not exist, and so the qualitative emissions analysis cannot be used to assess potential visibility impacts on nearby Class I areas from activities within the decision area. However implementation and compliance with the State Implementation Plan, specifically Section XVII Visibility Protection, is expected to result in meeting visibility goals under all management alternatives. In addition, site-specific EISs and environmental assessments (EA) will include a quantitative visibility analysis, if warranted by the project.

The emissions inventory was developed for the decision area using calculations based on the best available information about activities on BLM land provided by the Kanab Field Office (KFO). The calculations used emissions factors that are accepted and recognized by state and federal regulatory agencies. This analysis selected two different time frames to evaluate future emissions. The time frames reflect the current base year conditions and the long-term impacts. It is assumed that all, if any, increases in emissions will be constant and linear in time. The inventory time frames are:

- Current emissions (using the year 2006 as a basis)
- 20-year potential emissions for the long term (2026).

The analysis is based on the following assumptions:

- Emission factors recommended by the U.S. Environmental Protection Agency (EPA) (EPA 1995) are appropriate for all activities.

- Activity factors (i.e., the quantification of activity for each resource, such as oil and gas development, miles of routes maintained, vegetation treatments, and vehicle miles driven), including reasonably foreseeable developments (RFD), are appropriate for the base year and future time frame.
- Any anticipated recreational growth would follow growth trends for Utah over the past 10 years.
- For the qualitative analysis, only emissions from BLM-administered activities are included. (For the cumulative analysis, emissions calculated from the State of Utah are discussed.)
- Coal production will be 2 to 3 million tons per year for a total of 40 million tons over the life of the mine. Because underground coal mining does not have emission factors, surface mining factors are used (this is a conservative case assumption).
- Criteria pollutants and Hazardous Air Pollutants (HAP) are included in the calculations.
- Prescribed fire emissions are estimated using the Simple Approach Smoke Estimation Model (Sestak and Riebau 1988).

The most conservative case assumptions for air quality were used for the qualitative analysis. When a range of activity factors was assumed, the upper limit of the range was used to complete calculations for future time frames.

Emissions were calculated for the following activities: oil and gas development, lands and realty actions, livestock grazing, off-highway vehicle (OHV) use, maintenance of roads (emissions associated with exhaust and particulate matter from the operation of graders and other maintenance vehicles on unpaved roads and road shoulders), coal and salable mineral development, vegetation management, and prescribed burning. Although wildfires can occur in the decision area and may impact air quality, emissions from these sources were not included in the calculations because these are not considered human-caused sources and, unlike prescribed burns, are not under the control of the BLM.

Table 4-3 though Table 4-7 provide summaries of the emissions estimates for all alternatives. The base year emissions are also used to compare air quality impacts under other alternatives. Increase in air emissions is anticipated from the long-term BLM activities. The tables are broken down by activity and show emissions for the time frame referenced (e.g., base year and long term). Emissions are calculated on an annual basis (tons per year). In addition for both the base year and the long-term time frames, emissions were calculated for each alternative.

Using the well numbers, individual tables for all BLM activities in the decision area were calculated in linked spreadsheets. Because oil and gas field activities occur in phases (e.g., exploration, development, production, and closure), the components that must be included in emissions calculations are complex. These assumptions and calculations are available on an emissions CD. To understand the elements and assumptions used in the emissions please refer to the emissions CD, which is available from the BLM KFO. The assumptions and inputs used for each resource area are identified in the first two tabs of each major spreadsheet.

Table 4-3 through Table 4-8 displays summaries of total BLM emissions, estimated for the base year (2006) and the long term (2026). The tables are broken down by activity and show emissions for the time frame referenced (e.g., base year and long term). Emissions are calculated on an annual basis (tons per year). In addition, for both the base year and the long-term time frames, emissions were calculated for each alternative.

Because this air quality analysis is qualitative, it is not possible to determine the specific impacts of resource activities on air quality. No air emissions are expected as a result of implementing management actions for the following resources, resource uses, and designations and, therefore, they are not discussed in the air quality impacts discussion: water resources, special status species, visual resources, and other

designations (i.e., National Historic Trails, National Scenic Byways, State Scenic Byways, Utah Scenic Backways, and BLM Back Country Byways).

Impacts Common to All Alternatives

The air quality monitoring activities, which include construction of monitoring stations and vehicular travel to service the monitoring stations, would have minimal impact on air resources. Air quality monitoring would be the responsibility of the lessee. Information obtained from monitoring likely would add to the knowledge base on which future air-related decisions would be made.

Wildland fires and prescribed fires would cause short-term emissions of PM and carbon monoxide (CO) that could be spread over large portions of the decision area depending on the size of the fire and on wind conditions. In addition, PM emissions, CO, nitrogen oxides (NO_X), and hydrocarbons (which include HAPs) would result from use of heavy equipment during fire-suppression activities. Emissions would include those generated by internal combustion engines and non-vehicular emissions. The use of heavy equipment on unpaved and paved roads would cause emissions of PM, CO, NO_x, and hydrocarbons.

The various construction activities authorized under lands and realty for rights-of-way (ROW) (e.g., power, communication sites, transmission lines, pipelines projects) produce emissions of PM. Soil disturbing activities, including grading, bulldozing, trench digging, and travel on unpaved roads are considered the main causes of the emissions. Exhausts from vehicular travel and emissions from equipment use also would occur.

Livestock grazing and support of grazing activities, which includes trucking livestock into and out of the decision area and checking livestock range improvements and fences, generate both vehicular exhausts and dust. These emissions are also produced by construction activities and travel on unpaved and paved roads.

Air emissions would be produced during all phases of oil and gas development, including exploration, well development, production, and well and road reclamation. Emissions of PM, CO, NO_x, sulfur dioxide (SO_2), and hydrocarbons (including HAPs) would occur during exploration and development from traffic on unpaved and paved roads and during well development and completion from well flaring and associated emissions. Also, during well development, drilling and construction activities heavy equipment would cause PM emissions and gaseous emissions. Air emissions are probable during gas production. Emissions of NO_x and CO from compression activities (burning of natural gas) would occur. PM, CO, NO_x and hydrocarbon emissions (volatile organic compounds [VOC]) would be produced from any glycol operations and flashing. Any flaring would cause PM, CO, NO_x SO_2, and hydrocarbon emissions (including HAPs). During well abandonment and road closure, PM emissions would be caused by travel on unpaved roads and demolition activities.

Air emissions would be produced during mining operations and reclamation activities. During coal and salable mineral mining activities, PM emissions would be produced from overburden removal, blasting, truck loading, bulldozing, grading, storage piles, and travel of heavy equipment over unpaved roads. Vehicular exhausts (CO, NO_x, SO_2, and hydrocarbons) would result from heavy equipment and vehicular travel.

The major recreational impact on air quality would be from use of off-highway vehicles (OHV), including all-terrain vehicles (ATV) and off-highway motorcycles. Use of this popular recreational equipment would cause fugitive dust emissions of PM from traffic on unpaved trails, and vehicular exhausts of PM, CO, NO_x, and hydrocarbons.

Upward trends in populations within and surrounding the decision area would create the potential for long-term additional increases in emissions from many other resource management programs.

The maintenance of unpaved roads and shoulders of paved roads would cause PM emissions and emissions from vehicular exhausts. The primary source of these PM emissions is road graders.

Vegetation management and manipulation and the equipment used for these activities (e.g., fire engines, bulldozers) could cause dust from unpaved roads. Prescribed fires used for vegetation treatment could cause similar particulate and gaseous emissions as detailed in the previous discussion of emissions associated with wildland and prescribed fires. Areas receiving vegetation treatment could add short-term increases in PM until the vegetation recovers sufficiently to stabilize exposed soil.

Construction activity to manage wildlife and fish habitat would contribute PM to air emissions. To a lesser degree, CO, NO_x, SO_2, and hydrocarbons would be generated by vehicular exhaust. These impacts would be short term.

Because a quantitative relationship between the expected air emissions calculated above and the subsequent potential impacts on the air quality values of visibility, atmospheric deposition, or ozone are not known, it is not possible to draw any conclusions about the potential impacts expected to these air quality values. The BLM intends to make quantitative estimates required for project-specific EISs.

Base Year

Emissions were calculated for all existing activities and oil and gas well development for the base year (2006) to compare the potential increase in emissions from these activities over a 20-year time horizon (2026). Table 4-3 displays a summary of total emissions estimated by the BLM for the base year (2006) broken down by activity. Emissions are calculated on an annual basis (tons per year). The total estimated emissions calculated for 2006 are 2,694 tons per year.

Table 4-3. Base Year (2006) Emissions Inventory for the Decision Area (tons per year)

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Oil and Gas Well Development and Exploration							
Oil and Gas – Construction	14	3	37	1	9	1	0
Oil and Gas – Operations	7	2	23	0	21	18	2
Oil and Gas – Maintenance	0	0	0	0	0	0	0
Sub-Total: Oil and Gas[c]	**21**	**5**	**60**	**1**	**30**	**20**	**2**
Non-Oil and Gas Well Activities							
Coal Mining	318	318	409	45	724	38	4
Lands and Realty	2	0	1	0	0	0	0
Livestock Grazing	9	1	1	0	0	0	0
Off-Highway Vehicles (OHV)[a]	7	7	3	-	616	225	22
Road Maintenance	0	0	0	0	0	0	0
Salable Minerals	3	0	-	-	-	-	-
Vegetation	3	1	5	1	1	0	0
Prescribed Burning	152	126					

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Sub-Total: Non-Oil and Gas Well Activities[c]	**494**	**455**	**418**	**46**	**1,342**	**263**	**26**
Grand Total: Baseline (2006) – Existing Development[c]	**514**	**460**	**478**	**47**	**1,372**	**283**	**28**

Notes:
In December 2006 the Federal Government adopted new PM standards, which tighten the 24-hour fine particle (PM2.5) standard from 65 micrograms per cubic meter (μg/m^3) to 35 μg/m^3, and retained the current annual fine particle standard at 15 μg/m^3. The existing 24-hour PM_{10} standard of 150 μg/m^3 was retained and the annual PM_{10} standard was revoked due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. Although the Federal Government adopted the new standards, the states have not yet engaged in rule making to adopt the new standards.
[a] $PM_{2.5}$ assumed = PM_{10} for this activity.
[b] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1
[c] Total emissions are rounded to the nearest whole number, emissions less than 1 ton per year are designated as 0.

Alternative A

Table 4-4 summarizes total and specific pollutant emissions for Alternative A. These emissions were estimated for the base year (2006) time frame and for the long-term 20-year horizon. Total emissions for Alternative A increase over time from the base year of 2,694 tons per year of pollutants to 3,670 tons per year by 2026.

Given the low ambient concentrations for some of the pollutants in the decision area, it is expected that the increase in emissions of CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ for Alternative A would not cause any exceedance of State or federal ambient air quality standards.

Table 4-4. Alternative A Long-Term (2026) Emissions Inventory for the Decision Area (tons per year)

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Oil and Gas Well Development and Exploration							
Oil and Gas – Construction	14	3	37	1	9	1	0
Oil and Gas – Operations	12	3	28	0	23	22	2
Oil and Gas – Maintenance	1	0	0	0	0	0	0
Sub-Total: Oil and Gas[c]	**27**	**6**	**65**	**1**	**32**	**24**	**2**
Non-Oil and Gas Well Activities							
Coal Mining[a]	318	318	409	45	724	38	4
Lands and Realty	2	0	1	0	0	0	0
Livestock Grazing	9	1	1	0	0	0	0
Off-Highway Vehicles (OHV)[a]	16	16	7	-	1,306	479	48
Road Maintenance	0	0	0	0	0	0	0
Salable Minerals	3	0	-	-	-	-	-
Vegetation	3	1	5	1	1	0	0
Prescribed Burning	152	126					
Sub-Total: Non-Oil and Gas Well Activities[c]	**502**	**463**	**423**	**46**	**2,032**	**517**	**52**
Grand Total: Long Term (2026)[c]	**529**	**469**	**488**	**47**	**2,064**	**541**	**54**

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]

Notes:
[a] $PM_{2.5}$ assumed = PM_{10} for this activity.
[b] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1
[c] Total emissions are rounded to the nearest whole number, emissions less than 1 ton per year are designated as 0.

Alternative B

Table 4-5 summarizes total and specific pollutant emissions for Alternative B. These emissions were estimated for the base year (2006) time frame and for the long-term 20-year horizon. The total emissions for Alternative B increase over time from the base year of 2,694 tons per year of pollutants to 3,554 tons per year by 2026. Emissions for Alternative B are lower than for Alternative A because there are more emissions from OHV use for Alternative A, which results from more miles of open vehicle routes for Alternative A than for Alternative B.

However, given the low ambient concentrations that exist in the decision area for some of the pollutants, it is expected that the increase in emissions of CO, No_x, SO_2, PM_{10}, and $PM_{2.5}$ for Alternative B would not cause any exceedance of State or federal ambient air quality standards.

Table 4-5. Alternative B Long-Term (2026) Emissions Inventory for the Decision Area (tons per year)

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Oil and Gas Well Development and Exploration							
Oil and Gas – Construction	14	3	37	1	9	1	0
Oil and Gas – Operations	12	3	28	0	23	22	2
Oil and Gas – Maintenance	1	0	0	0	0	0	0
Sub-Total: Oil and Gas[c]	**27**	**6**	**65**	**1**	**32**	**24**	**2**
Non-Oil and Gas Well Activities							
Coal Mining[a]	318	318	409	45	724	38	4
Lands and Realty	2	0	1	0	0	0	0
Livestock Grazing	9	1	1	0	0	0	0
Off-Highway Vehicles (OHV)[a]	15	15	7	-	1,223	448	45
Road Maintenance	0	0	0	0	0	0	0
Salable Minerals	3	0	-	-	-	-	-
Vegetation	3	1	5	1	1	0	0
Prescribed Burning	152	126					
Sub-Total: Non-Oil and Gas Well Activities	**501**	**462**	**422**	**46**	**1,949**	**487**	**49**
Grand Total: Long Term (2026)[c]	**528**	**468**	**488**	**47**	**1,981**	**511**	**51**

Notes:
[a] $PM_{2.5}$ assumed = PM_{10} for this activity.
[b] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1
[c] Total emissions are rounded to the nearest whole number, emissions less than 1 ton per year are designated as 0.

Alternative C

Table 4-6 summarizes total and specific pollutant emissions for Alternative C. These emissions were estimated for the base year (2006) time frame and for the long-term 20-year horizon. The total emissions for Alternative C increase over time from the base year of 2,694 tons per year of pollutants to 2,841 tons per year by 2026. Emissions from Alternative C are the lowest of all the alternatives and lower than the emissions for Alternative A. Emissions for Alternative C are lower than for Alternative A because there are more emissions from OHV use for Alternative A, which results from more miles of open vehicle routes for Alternative A than for Alternative C.

However, given the low ambient concentrations that exist in the decision area for some of the pollutants, it is expected that the increase in emissions of CO, No_x, SO_2, PM_{10}, and $PM_{2.5}$ for Alternative C would not cause any exceedance of State or federal ambient air quality standards.

Table 4-6. Alternative C Long-Term (2026) Emissions Inventory for the Decision Area (tons per year)

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Oil and Gas Well Development and Exploration							
Oil and Gas – Construction	14	3	37	1	9	1	0
Oil and Gas – Operations	12	3	28	0	23	22	2
Oil and Gas – Maintenance	1	0	0	0	0	0	0
Sub-Total: Oil and Gas[c]	**27**	**6**	**65**	**1**	**32**	**24**	**2**
Non-Oil and Gas Well Activities							
Coal Mining[a]	318	318	409	45	724	38	4
Lands and Realty	2	0	1	0	0	0	0
Livestock Grazing	9	1	1	0	0	0	0
Off-Highway Vehicles (OHV)[a]	9	9	4	-	707	261	26
Road Maintenance	0	0	0	0	0	0	0
Salable Minerals	3	0	-	-	-	-	-
Vegetation	3	1	5	1	1	0	0
Prescribed Burning	152	126					
Sub-Total: Non-Oil and Gas Well Activities[c]	**495**	**456**	**419**	**46**	**1,432**	**299**	**30**
Grand Total: Long Term (2026)[c]	**522**	**462**	**484**	**47**	**1,465**	**323**	**32**

Notes:
[a] $PM_{2.5}$ assumed = PM_{10} for this activity.
[b] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1
[c] Total emissions are rounded to the nearest whole number, emissions less than 1 ton per year are designated as 0.

Alternative D

Table 4-7 summarizes total and specific pollutant emissions for Alternative D. These emissions were estimated for the base year (2006) time frame and for the long-term 20-year horizon. The total emissions for Alternative D increase over time from the base year of 2,694 tons per year of pollutants to 3,629 tons per year by 2026. Emissions for Alternative D are lower than for Alternative A because there are more

emissions from OHV use for Alternative A, which results from more miles of open vehicle routes for Alternative A than for Alternative D.

However, given the low ambient concentrations that exist in the decision area for some of the pollutants, it is expected that the increase in emissions D of CO, No_x, SO_2, PM_{10}, and $PM_{2.5}$ for Alternative would not cause any exceedance of State or federal ambient air quality standards.

Table 4-7. Alternative D Long-Term (2026) Emissions Inventory for the Decision Area (tons per year)

Activity	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPs[b]
Oil and Gas Well Development and Exploration							
Oil and Gas – Construction	14	3	37	1	9	1	0
Oil and Gas – Operations	12	3	28	0	23	22	2
Oil and Gas – Maintenance	1	0	0	0	0	0	0
Sub-Total: Oil and Gas[c]	**27**	**6**	**65**	**1**	**32**	**24**	**2**
Non-Oil and Gas Well Activities							
Coal Mining[a]	318	318	409	45	724	38	4
Lands and Realty	2	0	1	0	0	0	0
Livestock Grazing	9	1	1	0	0	0	0
Off-Highway Vehicles (OHV)[a]	15	15	7	-	1,276	468	47
Road Maintenance	0	0	0	0	0	0	0
Salable Minerals	3	0	-	-	-	-	-
Vegetation	3	1	5	1	1	0	0
Prescribed Burning	152	126					
Sub-Total: Non-Oil and Gas Well Activities[c]	**502**	**463**	**423**	**46**	**2,002**	**506**	**51**
Grand Total: Long Term (2026)[c]	**529**	**469**	**488**	**47**	**2,034**	**530**	**53**

Notes:
[a] $PM_{2.5}$ assumed = PM_{10} for this activity.
[b] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1
[c] Total emissions are rounded to the nearest whole number, emissions less than 1 ton per year are designated as 0.

Summary

A qualitative emission comparison approach was selected for the air quality impact analysis. This analysis shows that under all alternatives, there will be little to no impacts. The emissions calculations were based on the best available engineering data and assumptions, on air, visibility, and atmospheric deposition data, on emission inventory procedures, and on professional and scientific judgment. However, where specific data or procedures were not available, assumptions were made. There are limitations associated with this approach. However, given uncertainties about the number, nature, and specific location of future sources and activities, the emission comparison approach is defensible and provides a sound basis for comparing alternatives.

The criteria pollutants in the decision area were determined to be NO_2, SO_2, CO, and PM_{10} and $PM_{2.5}$ on the basis of the BLM analysis.

The emissions inventory results and qualitative impacts for the alternatives are shown in Table 4-3 through Table 4-7. Total emissions for each alternative are summarized in Table 4-8. Table 4-9 shows the increase in emissions for each alternative from the baseline year to the long term in 2026. The table also shows the percent increase in emissions from the base-year to the long-term, and the percent increase for each alternative from Alternative A.

Table 4-8. Long-Term (2026) Emissions Inventory for the Decision Area (tons per year)

Alternative	2006	2026
Alternative A	2,694	3,670
Alternative B	2,694	3,554
Alternative C	2,694	2,841
Alternative D	2,694	3,629

Note: Totals are for all criteria pollutants minus $PM_{2.5}$, which is a subset of PM_{10}.

The following conclusions are based on the emissions calculations performed for this analysis. Under Alternative A, emissions were calculated for the base year (2006) and for the 20-year (2026) horizon, and these emissions estimates serve as the basis for comparing alternatives. Information in Table 4-8 indicates that for Alternative A total emissions of criteria pollutants would increase from 2,694 tons per year in the base year (2006) to 3,670 tons per year by 2026. The increase would result primarily from OHV activities, not from oil and gas activities. Emissions for Alternatives B and C (3,554 and 2,841 tons per year, respectively) would be lower than for Alternative A (3,670 per year in 2026). Emissions for Alternative D (3,629 tons per year) also are lower than for Alternative A, but are higher than for Alternatives B and C. Emissions are higher for Alternative A than for the other alternatives because there are more miles of proposed OHV routes for Alternative A (1,499 miles) than for Alternative B (1,387 miles), Alternative C (1,190 miles), or Alternative D (1,464 miles).

Table 4-9. Increase in Annual Air Emissions from 2006 Conditions in the Decision Area

Time Frame	PM10	PM 2.5	NOx	SO2	CO	VOC	HAPs
Alternative A							
2026 Increase in emissions from base year	15 (3%)	9 (2%)	10 (2%)	0 (0%)	692 (50%)	258 (91%)	26 (93%)
Alternative B							
2026 Percent increase in emissions from base year	14 (3%)	8 (2%)	10 (2%)	0 (0%)	609 (44%)	228 (81%)	23 (82%)
Percent increase in emissions from Alternative A	–1 (0%)	–1 (0%)	0 (0%)	0 (0%)	–83 (–4%)	–30 (–6%)	–3 (–6%)
Alternative C							
2026 Percent increase in emissions from base year	8 (2%)	2 (1%)	6 (1%)	0 (0%)	93 (7%)	40 (14%)	4 (14%)
Percent increase in emissions from Alternative A	–7 (–1%)	–7% (–1%)	–4 (–1%)	0 (0%)	–599 (–29%)	–218 (–40%)	–22 –40%

Time Frame	PM10	PM 2.5	NOx	SO2	CO	VOC	HAPs
Alternative D							
2026 Percent increase in emissions from base year	15 (3%)	9 (2%)	10 (2%)	0 (0%)	662 (48%)	247 (87%)	25 (89%)
Percent increase in emissions from Alternative A	0 (0%)	0 (0%)	0 (0%)	0 (0%)	–30 (–1%)	–11 (–2%)	–1 (–2%)

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Impacts on the air quality resource in the decision area are not irreversible or irretrievable. However, committed actions that consume PSD increments would use up available PSD increments for other proposed sources. For this EIS, there are no proposed or reasonably foreseeable actions by the BLM that will require PSD permitting.

There will be no loss of long-term productivity due to short-term uses proposed in the alternatives. Activities planned will produce some level of air emissions even with mitigation. However, none of the activities proposed in this EIS will produce unavoidable adverse impacts on the air quality resource.

4.2.2 Impacts on Soil Resources

This section discusses impacts on soils from management actions of other resources and resource uses. Soils, especially in sensitive soil areas, are susceptible to impacts from surface disturbance and compaction, which can lead to accelerated erosion, soil loss, and reduced productivity. Management actions involving ground disturbing activities that reduce vegetation cover, and using vehicles and heavy machinery could contribute to soils impacts. Management actions that restrict surface disturbing activities could protect soil resources, especially on soils identified as fragile.

This analysis was based on the following assumptions:

- Sensitive soils would be managed to minimize erosion above natural levels and maintain soil productivity.
- Soil resources would be managed to help maintain site productivity.

Although management actions would be designed to minimize impacts, and BMPs and other necessary protection measures would be implemented, there are greater inherent risks when surface disturbing activities occur on soils identified as fragile. The analysis considered the location of fragile soils and the potential proposed locations of management activities.

Impacts on soil resources would occur from activities associated with transportation management, vegetation, wildland fire ecology, minerals and energy, and livestock grazing. Soils management actions and actions that prohibit surface disturbing actions such as management associated with ACECs, wild and scenic rivers (WSR), WC areas, fish and wildlife, and special status species habitat could maintain or improve soil conditions.

Under all alternatives, impacts on soil resources are not anticipated as a result of implementing management actions for the following resources and designations: air quality, paleontological resources, and other designations.

Impacts Common to All Alternatives

Wildland Fire

In the short term, loss of vegetative cover due to wildland fire could affect soil quality through the loss of soil structure and temporary reduced porosity of soils in the impacted areas. The reduction in porosity and structure could result in a decrease in infiltration rates and increased erosion and runoff (Ralston and Hatchell 1971). However, BMPs associated with wildland fire ecology management actions would reduce impacts associated with soil loss and the potential for sediment loading and sedimentation. Erosion control measures and seeding may be proposed as post-fire treatments (emergency stabilization and rehabilitation [ESR] or other) to stabilize these sites and to contain and control soil loss.

Where it is expected that fire severity could adversely impact sensitive soils, an appropriate management response (AMR) would be implemented. Some level of ground disturbing activities associated with suppression, prescribed fire, and non-fire fuel treatments would be likely to occur. Indirect impacts include potential soil loss from wind and water erosion.

Over the long term, as areas within the decision area are treated and experience fire return intervals closer to historic fire return intervals, a trend toward less severe wildland fires would occur, resulting in fewer impacts on soils (including microbial populations, soil temperatures, and the chemical and physical

structure of the soil). Wildland fire ecology management actions would continue to allow for aggressive fire suppression in areas with sensitive soils, and where fire has not played a significant role in the past.

To foster healthy native understory communities and to maintain and/or improve soil resources and reduce erosion potential over the long term, planned fire-management and fuel-reduction actions would be implemented. These actions could also decrease the potential for destruction of biological crusts by severe fire events. Planned actions (prescribed fire and non-fire fuel treatments) could also continue to reduce the likelihood of severe wildland fires and subsequent loss of soil structure, altered porosity, and altered infiltration rates. As the role of fire returns to a more natural pattern, there would be fewer indirect impacts from large, severe wildland fires, including, but not limited to, a reduction in wind and water erosion.

Actions Resulting in Soil Disturbance or Compaction

Implementing BMPs, erosion control measures, and other decisions that mitigate surface disturbing activities would reduce or minimize water and wind erosion, stabilize soils, reduce soil compaction, and maintain soil productivity. Managing livestock grazing according to the Standards and Guidelines would help to meet soil resource objectives and reduce soil erosion. Localized removal of plant cover, soil compaction, and lower infiltration rates could occur in areas of livestock concentration and trailing. However, these impacts would be site-specific, short term, and localized. Adhering to the grazing guidelines and managing to maintain or make progress toward the *Standards for Rangeland Health* would help maintain or improve existing soil conditions and help prevent impacts from becoming significant.

It is anticipated that development of coal resources would result in the total disturbance of 3,600 acres over the 20-year planning horizon (Appendix I), which could result in localized loss of topsoil, removal of plant cover, and soil compaction. However, applying BMPs to and reclaiming land concurrently with the coal mining (approximately 100 acres per year) would reduce these impacts on soil resources. In addition, site-specific NEPA analysis of the impacts on soil resources is required prior to approval of a coal lease.

Alternative A

Fragile Soil Areas

Limiting OHV use to existing roads and trails in fragile soil areas and not allowing mechanical land treatments in fragile soil areas would help minimize the risk of soil erosion. Because these soils are naturally susceptible to erosion, there is a greater risk of some loss of soil productivity on all 6,300 acres (100% of fragile soils) of fragile soils that would be open to oil and gas leasing subject to standard terms and conditions or open subject to moderate constraints. The terms and conditions, as well as the timing limitations may not provide the measures needed to protect or restore disturbance in these areas due to inherent soil vulnerability.

Actions that Actively Affect Vegetation

Vegetation treatments would decrease vegetation cover, which could reduce protection of the soil surface from rain, surface runoff, and wind erosion in the initial year after treatment. Mechanical or manual vegetation treatments could result in soil disturbance and compaction at the treatment site. Mitigations based on site-specific soil characteristics and initial growth of desired plant species would reduce these short-term impacts. Over the long term, treatments would improve vegetation health and cover, maintain soil resources, and improve soil productivity.

Similar to vegetation treatments, managing areas for forestry and woodland products harvest could result in short-term increases in erosion and soil loss. However, over the long-term soil resources would be maintained and understory vegetation would be established or restored.

Actions Resulting in Soil Disturbance or Compaction

Surface disturbing activities could remove vegetation and topsoil and result in compaction or loss of some of the exposed soil surface. Decreases in vegetation cover generally reduce soil protection from rain, surface runoff, and wind erosion. Several permitted activities (e.g., buried pipeline construction and overhead powerline construction) result in short-term removal or disturbance of vegetation and soil, but reclamation would be required to stabilize soil and reduce or eliminate long-term soil erosion. In such cases, there should be little long-term loss of soil or soil productivity. However, these activities on sensitive or fragile soils may pose a higher risk of failure of reclamation activities.

Other projects/activities may cause the soil to be exposed for extended periods of time. To avoid increased erosion, BMPs would be implemented to minimize erosion. Areas where soils have been compacted to harden the surface (e.g., roads, routes, trails, well pads, and communication sites) have very low infiltration rates, which could lead to high amounts of runoff from these surfaces. As water leaves the compacted areas and encounters uncompacted soils, extensive erosion could occur. Project design and proper construction can ensure water drainage from the compacted surfaces would not result in significant impacts caused by excessive erosion.

Applying stipulations on oil and gas exploration and development activities could minimize soil erosion resulting from surface disturbing activities. These activities could result in site-specific impacts on soil resources through removal of vegetation and topsoil during development activities (e.g., well pad construction, digging, leveling, and scraping) and through surface disturbance while constructing ancillary features (e.g., roads or pipelines) or during exploration. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, controlled surface use [CSU]) (51,200 acres, 9%), areas open to oil and gas leasing subject to major constraints (no surface occupancy [NSO]) (5,500 acres, 1%), and areas closed to oil and gas leasing (75,100 acres, 14%) of the decision area (Map 2-29). The RFD (Appendix I) projects a total of 90 wells (70 exploration and 20 new production wells) could be drilled during the next 20 years, which could result in a future surface disturbance of 2,070 acres, with 906 acres of disturbance from seismic operations. Approximately 2,370 acres of the total 2,976 acres would be reclaimed (Appendix I) over the long term.

In addition to oil and gas leasing stipulations, locatable mineral withdrawals, mineral material closures, and restricting surface disturbing activities would similarly help protect soil resources from erosion. The Sand Springs area and Diana's Throne would be recommended for withdrawal from locatable minerals in addition to the 24,591 acres currently withdrawn. Crescent Butte, Shinarump Cliffs, and Vermilion Cliffs recreation sites, and the 40-acre ponderosa pine area would be closed to mineral material disposals. In addition, areas managed as no surface disturbing actions (14,900 acres, 3%) and areas with seasonal limitations on surface disturbing actions (52,300 acres) would further restrict surface disturbing activities (Map 2-43). These actions would help protect soil resources by retaining vegetation and reducing erosion.

Visual Resource Management (VRM) Class I areas (21,200 acres, 4%) would limit the amount of surface disturbance, which would indirectly maintain soil resources. Areas designated as VRM Class I would be managed to preserve the existing landscape characters; thus, there would be little or no surface disturbance that could contribute to soil compaction, soil loss, and erosion.

Cross-country OHV use throughout 466,600 acres (84%) could disturb and reduce surface cover (i.e., soil-stabilizing vegetation, organic litter, rocks, and soil crusts), displace soil particles, and increase soil compaction. These impacts could create new water flow paths and channels, and reduce water infiltration. As infiltration is reduced, new flow paths could form. Decreases in vegetation through crushing and soil compaction and decreases in soil crusts could reduce the stabilizing characteristics of soil in some cases. Under these conditions, increased soil loss due to wind erosion could occur.

OHV use would be limited to 57 miles of designated or existing routes on 66,200 acres (12%), indirectly protecting nearby soils from increased erosion by focusing impacts on compacted surfaces. Closing 21,200 acres (4%) to OHV use likely would reduce any OHV-related soil impacts in these areas.

Recreation (outside OHV use)

Dispersed recreation activities could have site-specific impacts such as a reduction in plant cover, soil compaction, and loss of soil productivity. Development of recreation facilities in the Moquith Mountain area could result in soil compaction in some site-specific areas.

Alternative B

Fragile Soil Areas

Implementing site-specific restrictions and/or mitigations for surface disturbing activities (e.g., open to oil and gas leasing subject to moderate constraints [controlled surface use]) and not allowing cross-country OHV use in fragile soil areas would help minimize the risk of soil erosion. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion would help maintain or improve vegetation conditions, maintain or reduce erosion rates and improve soil productivity. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment.

Actions that Actively Affect Vegetation

Vegetation treatments on an average of no more than 22,300 acres annually would decrease vegetation cover, which could reduce soil protection from rain, surface runoff, and wind erosion in the initial year after treatment. Mitigations based on site-specific soil characteristics, plus initial growth of desired plant species would reduce these short-term impacts. Over the long term, these treatments should improve vegetation health and cover, maintain soil resources, and improve soil productivity. However, if less than an annual average of 4,650 acres were treated, shrublands generally would convert into woodlands and reduce understory vegetation. The loss of understory vegetation could, over the long term, increase the susceptibility of soil resources to erosion.

Similar to vegetation treatments, managing areas for forest and woodland product harvest could result in short-term increases in erosion and soil loss. However, long-term results would be to maintain soil resources and allow understory vegetation to be established or restored.

Actions Resulting in Soil Disturbance or Compaction

Compared to Alternative A, the magnitude and intensity of the impacts from surface disturbing activities would decrease based on more restrictions and stipulations on surface disturbing activities, including increasing restrictions on oil and gas activities and establishing ROW avoidance and exclusion areas. Management actions for resources and resource uses that apply stipulations to surface disturbing activities could help reduce soil erosion. These management actions include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (105,500 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (52,600 acres more than Alternative A), and areas closed to oil and gas leasing (700 acres more than for Alternative A) (Map 2-30). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would further reduce soil erosion.

In addition to oil and gas leasing stipulations, locatable mineral withdrawals (9,500 acres) and mineral material closures (78,500 aces) could similarly help reduce soil erosion by restricting surface disturbances. The Cottonwood Canyon ACEC and suitable WSR corridors would be recommended for

withdrawal from locatable minerals activities (Map 2-23) and closed to mineral material disposals (Map 2-34). In addition, areas managed as no surface disturbing actions (4,800 acres more than for Alternative A), areas with seasonal limitations on surface disturbing actions (133,400 acres more than for Alternative A) (Map 2-44), and ROW exclusion areas (75,700 acres or 14%) (Map 2-20) would further restrict surface disturbing activities.

VRM Class I areas (76,000 acres, 14%) would limit the amount of surface disturbance, which would indirectly maintain soil resources. Areas designated VRM Class I would be managed to preserve the existing landscape characters; thus, there would be little or no surface disturbance that could contribute to increased soil compaction, soil loss, and erosion. Reclamation would be expected to stabilize soils and reduce or eliminate long-term soil erosion.

Impacts on soils from cross-country OHV use would nearly be eliminated under Alternative B when compared to Alternative A because the number of acres open to OHV use would be reduced to only 1,100 acres, mainly in areas with naturally disturbed soils such as sand dunes. Instead of cross-country OHV use, OHV use would be limited to 1,387 miles of designated routes on 524,000 acres (95%), indirectly protecting nearby soils from increased erosion by focusing impacts on compacted surfaces that have already been impacted. Closing 28,900 acres (5%) to OHV use likely would reduce OHV-related soil impacts in these areas.

Recreation (outside OHV use)

Although identification of and development within Special Recreation Management Areas (SRMA) (125,800 acres, 23%) could result in soil compaction in some areas, increasing management presence would decrease campsite establishment or expansion and decrease the associated impacts on soils of compaction and overland erosion. Motorized activities in SRMAs could increase use on routes, which could indirectly protect nearby soils from increased erosion because surface disturbance would be focused in areas that have already been impacted. Non-motorized activities in SRMAs would be more dispersed, which could have site-specific impacts in areas of concentrated use. Proper management and public education would reduce the intensity and magnitude of these impacts on soil resources.

Dispersed recreation activities and special recreation permits (SRP) could have site-specific impacts in areas of concentrated use. Impacts could include a reduction in plant cover, soil compaction, and loss of soil productivity. However, restrictions attached to SRPs would minimize these impacts.

Alternative C

Fragile Soil Areas

Precluding surface disturbing activities (e.g., open to oil and gas leasing subject to major constraints [NSO]) and not allowing cross-country OHV use in fragile soil areas could help protect and maintain fragile soil resources. The protection of fragile soils could maintain existing vegetation conditions, minimizing the risk of soil erosion and loss of soil productivity. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion would help maintain or improve vegetation conditions, maintain or reduce erosion rates and improve soil productivity. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment.

Actions that Actively Affect Vegetation

The magnitude and intensity of impacts from implementing vegetation treatments would be greater than those described under Alternative A. Implementing vegetation treatments on an annual average of at least 4,650 acres (93,000 acres over the life of the plan), not to exceed an annual average of 22,300 acres (446,000 acres over the life of the plan), and using preferred treatment methods that mimic natural

processes (e.g., prescribed fire, biological, and hand cutting) likely would result in a slower process of vegetation enhancement compared to Alternative A and Alternative B. The slower rate of vegetation enhancement could result in the soil surface being exposed for a longer period of time, which could reduce soil surface protection from rain, surface runoff, and wind erosion. Mitigations based on site-specific characteristics, as well as initial growth of desired plant species would reduce these short-term impacts. Over the long term, treatments should improve vegetation health and cover, maintain soil resources, and improve soil productivity. Precluding forest and woodland product harvest and closing riparian areas to woodland products harvest could maintain existing soil conditions. Short-term impacts such as erosion and soil loss would not occur.

Actions Resulting in Soil Disturbance or Compaction

The magnitude and intensity of impacts from surface disturbing activities would further decrease based on additional restrictions and stipulations on surface disturbing activities. Further increasing stipulations on oil and gas exploration and development activities could help protect soil resources and minimize erosion. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (218,700 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (77,600 acres more than for Alternative A), closing areas to oil and gas leasing (97,500 acres more than for Alternative A) (Map 2-31). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would further reduce soil erosion.

In addition to oil and gas leasing stipulations, locatable mineral withdrawals (158,800 acres) and mineral material closures (175,000 acres) would similarly help protect soil resources and minimize erosion by restricting surface disturbances. WC areas, ACEC, WSR, and SRMA management actions would recommend areas for withdrawal from locatable mineral entry (158,800 acres, 29%) (Map 2-24). WC areas, WSA, ACEC, WSR, and SRMA management actions would close areas to mineral material sales (175,000 acres, 32%) (Map 2-35). In addition, areas managed as no surface disturbing actions (17,800 acres more than for Alternative A), areas with seasonal limitations on surface disturbing actions (414,100 acres more than for Alternative A) (Map 2-45), and ROW exclusion areas (255,200 acres, 46%) (Map 2-21) would further restrict surface disturbing activities.

VRM Class I areas (168,300 acres or 30%) would limit the amount of surface disturbance, which would indirectly maintain soil resources. Areas designated VRM Class I would be managed to preserve the existing landscape characters; thus, there would be little or no surface disturbance that could contribute to soil compaction, soil loss, and erosion. Reclamation would stabilize soils and reduce or eliminate long-term soil erosion. There would be little long-term loss of soil or soil productivity.

Impacts on soils from cross-country OHV use would be eliminated compared to Alternative A because no acres would be open to such use. OHV use would be limited to 1,190 miles of designated routes on 388,300 acres (70%), indirectly protecting nearby soils from increased erosion by focusing impacts on compacted surfaces. Closing 165,700 acres (30%) to OHV use likely would reduce any OHV-related soil impacts in these areas.

Recreation (outside OHV use)

Although identification of and development within SRMAs (129,050 acres, 23%) could result in soil compaction in some areas, increasing management presence would decrease campsite establishment or expansion and decrease the associated impacts on soils of compaction and overland erosion. Proper

management and public education would reduce the intensity and magnitude of these impacts on soil resources.

Impacts from dispersed recreation activities and SRPs would be the same as for Alternative B.

Alternative D

Fragile Soil Areas

Allowing activities in fragile soil areas could reduce surface cover and increase soil compaction. These impacts could create new water flow paths and channels, and reduce water infiltration. New water flow paths and channels and increased overland flow could increase the potential for erosion. As infiltration is reduced, new flow paths could form overland water flow that increases the amount of sediment eroded by water. There is a greater risk of some loss of soil productivity on all 6,290 acres (almost 100% of fragile soils) of fragile soils that would be open to oil and gas leasing subject to standard terms and conditions or open subject to moderate constraints. The terms and conditions, as well as the timing limitations may not provide the measures needed to protect or restore disturbance in these areas due to inherent soil vulnerability. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion and restoring watersheds would help maintain water quality by reducing the amount of sediment loading from these saline soils to nearby streams from disturbed fragile soil areas. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment. Not allowing cross-country OHV use and incorporating erosion control measures in fragile soil areas would help protect fragile soil resources.

Actions that Actively Affect Vegetation

Impacts from vegetation treatments would be the same as for Alternative B. Managing areas for forest and woodland product harvest could result in increases in erosion and soil loss in the initial year after harvest. Mitigations based on site-specific soil characteristics, as well as initial growth of desired plant species would reduce these short-term impacts. However, long-term results would be to maintain soil resources, specifically in areas of woodland product harvest, and allow understory vegetation to be established/restored.

Actions Resulting in Soil Disturbance or Compaction

Alternative D would be less restrictive on oil and gas exploration and development activities compared to Alternative B and Alternative C, but more restrictive than Alternative A. The magnitude of impacts could increase due to fewer restrictions on surface disturbing activities compared to Alternative B and Alternative C. Stipulations on oil and gas exploration and development activities could help protect soil resources and minimize erosion. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (13,400 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (17,500 acres more than for Alternative A), and closing areas to oil and gas leasing (75,100 acres, the same as for Alternative A) (Map 2-32). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would further reduce soil erosion.

In addition to oil and gas leasing stipulations, locatable mineral withdrawals (7 acres) and mineral material closures (21200 acres) would similarly help protect soil resources and minimize erosion by restricting surface disturbances. Areas managed as no surface disturbing actions (4,800 acres more than for Alternative A), areas with seasonal limitations on surface disturbing actions (19,500 acres more than

for Alternative A) (Map 2-46), and ROW exclusion areas (75,200 acres, 14%) (Map 2-22) would further restrict surface disturbing activities.

VRM Class I areas (75,400 acres, 14%) would limit the amount of surface disturbance, which would indirectly maintain soil resources. Areas designated VRM Class I would be managed to preserve the existing landscape characters; thus, there would be little or no surface disturbance that could contribute to soil compaction, soil loss, and erosion.

Impacts on soils from cross-country OHV use would nearly be eliminated compared to Alternative A because the number of acres open to OHV use would be reduced to only 1,100 acres, mainly in areas with naturally disturbed soils such as sand dunes and ephemeral washes. Instead of cross-country OHV use, OHV use would be limited to 1,464 miles of designated routes on 525,300 acres (95%), indirectly protecting nearby soils from increased erosion by focusing impacts on compacted surfaces. Closing 27,600 acres (5%) to OHV use likely would reduce any OHV-related soil impacts in these areas.

Reclamation would stabilize soils and reduce or eliminate long-term soil erosion. There would be little long-term loss of soil or soil productivity.

Recreation (outside OHV use)

Although identification of and development within SRMAs (122,800 acres or 22%) could result in soil compaction in some areas, increasing management presence would decrease campsite establishment or expansion, and decrease the associated impacts on soils of compaction and overland erosion. Motorized activities in SRMAs could increase use on routes, which could indirectly protect nearby soils from increased erosion because surface disturbance would be focused on areas that have already been impacted. Non-motorized activities in SRMAs would be more dispersed, which could have site-specific impacts in areas of concentrated use. Proper management and public education would reduce the intensity and magnitude of these impacts on soil resources.

Impacts from dispersed recreation activities and SRPs would be the same as for those described in Alternative B.

Summary

Surface disturbing activities could remove vegetation and topsoil, and result in compaction or loss of some of the exposed soil surface, resulting in the majority of impacts on soil resources. Management actions that limit surface disturbing activities or implement BMPs (Appendix A) and mitigation measures would protect and maintain current soil resources and minimize erosion. Cross-country OHV use could increase soil compaction, reduce water infiltration, and increase the potential for soil loss and erosion. Alternative B would place more restrictions on surface disturbing activities, including cross-country OHV use and mineral development, and help protect soil resources more than Alternative A and Alternative D. Alternative C management actions would place the greatest restrictions on surface disturbing activities and thus provide the greatest amount of protection to soil resources (particularly fragile soil areas). Alternative D would allow some activities in fragile soil areas which could increase the potential for soil loss and erosion.

Vegetation treatments would decrease vegetation cover which could reduce soil surface protection from rain, surface runoff, and wind erosion in the initial year after treatment. Over the long term treatments would improve vegetation health and cover, maintain soil resources, and improve soil productivity. Vegetation treatment management actions under Alternatives B, C and D would improve soil condition by improving vegetation and decreasing the potential for soil loss and erosion.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Implementation of management actions could result in surface disturbing activities that would result in loss of irreversible or irretrievable resources. Surface disturbing activities could remove vegetation, increase erosion, and contribute to irreversible soil loss. However, management actions and BMPs are intended to reduce the magnitude and results of these possible impacts.

The short-term use of soil resources generally would not affect long-term productivity where BMPs are appropriately applied. BMPs could include reclaiming disturbed areas to the fullest extent possible, establishing vegetation cover as soon as possible, or designing facilities to minimize surface disturbance.

Surface disturbance activities could result in unavoidable adverse impacts. Although these impacts would be mitigated to the extent possible, some unavoidable impacts would occur. Loss of soil resources to other uses, such as transportation and mineral and energy development, could result in a long-term loss of site-specific soil productivity on approximately 8,426 acres associated with such development, although after mitigation such impacts would be limited to 4,056 acres.

4.2.3 Impacts on Water Resources

This section presents potential impacts on water resources from management actions for other resource programs. Existing conditions for water resources are described in Chapter 3. The discussion of impacts on water resources is limited to the effects of surface disturbing activities on water quality and watershed health. Activities that disturb the land surface, decrease vegetation cover, or otherwise alter land surface cover would potentially affect water quality and watershed health. Watershed health is characterized by watersheds that are in, or making significant progress toward, properly functioning physical condition (including their upland, riparian/wetland, and aquatic components) where soil and plant conditions support infiltration and soil moisture storage and where the release of water is in balance with climate and landform and maintains or improves water quality, water quantity, and timing and duration of flow (BLM 1997a).

The analysis is based on the following assumptions:

- Substantial surface disturbance to soil, including compaction of soil or loss of vegetative cover, could increase water runoff and downstream sediment loads, thereby degrading water quality, altering channel structure, and affecting overall watershed health.
- The degree of impact attributed to any one disturbance or series of disturbances would be affected by several factors, including location within the watershed, time and degree of disturbance, existing vegetation, soil type, and precipitation.
- Restrictions on surface disturbing activities should help protect and maintain current water quality, and minimize erosion and sedimentation.
- A change of pollutants in surface waters could affect other beneficial uses (e.g., stock-watering, irrigation, fisheries/aquatic life, recreation, and/or drinking water supplies).

Under all alternatives, impacts on water resources are not anticipated as a result of implementing management actions for the following resources and designations: air quality, paleontological resources, and other designations.

Impacts Common to All Alternatives

Planned Actions that Affect Vegetation

Vegetation treatments, including vegetation treatments for ecological purposes, rangeland treatments, or non-fire fuels treatments, would reduce vegetation cover in the short term, which could increase overland flow and increase sediment loading. Short-term soil exposure and reduced vegetation cover could affect watershed health by reducing water infiltration rates and increasing overland flow and sediment loading, which could affect water quality parameters, including turbidity, temperature, and nutrient loading. Over the long term, vegetation management should improve watershed health and vegetation cover, maintain soil resources, and reduce overland flow and sediment loading.

Managing livestock grazing according to the Standards and Guidelines would eliminate long-term impacts from site-specific, short-term disturbance associated with concentrated livestock use. Erosion of exposed soils resulting from short-term concentrated grazing use would decrease, resulting in stabilized soils and less site-specific erosion so that areas meet *Standards for Rangeland Health.* This would improve water quality and decrease siltation and sediment loading of streams. Minimizing site-specific erosion and minimizing any reduction in plant cover would reduce long-term sediment loading.

Wildland Fire

In the short term, the potential increase in wildland fire acres (including wildland fire use), prescribed fire, and non-fire fuel treatments could increase runoff, erosion, and stream temperatures. Increased erosion and runoff could result in greater nutrient concentration and turbidity in surface waters. Disturbance associated with prescribed fire and non-fire fuel treatments would be evaluated through an environmental planning and review process that would consider impacts related to surface runoff, soil loss, and sediment input to surface waters. Often these impacts are short term and conditions return to pre-fire levels or better once vegetation is reestablished.

The wildland fire ecology management actions would allow more flexibility in planned activities to manage fuel loads and would implement resource protection measures to reduce potential effects to water resources. Potential impacts on water resource issues would be considered before implementing prescribed burns, non-fire fuel treatments, or ESR efforts.

In the short term, minor impacts on groundwater quality may result from altered water absorption patterns (due to a decrease in vegetation cover following wildland fire or fuel treatments) and soil compaction (due to mechanical equipment). In addition, infiltration capacity could temporarily decrease after a fire due to the formation of a hydrophobic soil layer. Altered water infiltration rates could temporarily increase or decrease the chemical levels (i.e., dissolved solids) in shallow aquifers (Allison et al. 1994). The impact on groundwater would depend on the depth to groundwater below ground surface and the type of sediments or bedrock through which it passes. The possible changes in the infiltration capacity of soils would depend on fire severity, soil type, pervasiveness of vegetation root structures, and vegetation's ability to reoccupy a site following fire.

Over the long term, wildland fires would tend to be less severe, resulting in relatively fewer impacts on storm flows and nutrient and sediment loads. A trend toward fewer severe wildland fires would help maintain soil stability and could enhance overall watershed health. Some areas would have a more sustainable supply of woody debris or stream bank vegetation, both of which would tend to also increase stream bank stability.

Over the long term, planned fire actions and eventual restoration of natural fire regimes could improve water resources by reducing the risk of high-severity wildland fire and promoting self-sustaining native vegetation types. The wildland fire ecology management actions would reduce erosion potential over the long term by fostering a healthy, native understory. These actions would allow more flexibility in implementing and timing planned actions that would protect water resources.

Planned (BLM) or Permitted (BLM-Approved) Actions Requiring Surface Disturbance

Water resource management actions common to all alternatives, including implementing BMPs and erosion control measures, and vegetation management actions common to all alternatives regarding riparian areas, would help to meet watershed objectives and reduce erosion and sediment loading to nearby streams and rivers. Applying the BMPs to surface disturbing activities (Appendix A) would help maintain water quality and watershed health by decreasing siltation and sediment loading to nearby streams.

The development of coal resources would be anticipated to result in the total disturbance of 3,600 acres over the 20-year planning horizon, which could result in site-specific increases in overland flow and sedimentation. However, applying BMPs to and reclaiming disturbed areas concurrently with the coal mining would reduce these impacts on water resources. In addition, site-specific NEPA analysis of the impacts on water resources is required prior to approval of the coal lease.

Alternative A

Activities on Fragile Soils

Limiting OHV use to existing roads and trails in fragile soil areas and not allowing mechanical land treatments in fragile soil areas would help minimize the risk of soil erosion and sedimentation. The protection of these saline soils would help maintain water quality and watershed health by limiting the amount of erosion and the amount of sediment and salt loading of nearby streams and rivers from disturbed fragile soil areas. In addition, there is a greater risk of some loss of soil productivity on all 6,300 acres (100% of fragile soils) of fragile soils that would be open to oil and gas leasing subject to standard terms and conditions or open subject to moderate constraints. The terms and conditions, as well as the timing limitations may not provide the measures needed to protect or restore disturbance in these areas due to inherent soil vulnerability.

Planned Actions that Affect Vegetation

Vegetation treatments, including vegetation treatments for ecological purposes, rangeland treatments, or non-fire fuels treatments could, in the short term, reduce watershed health and vegetation cover and increase overland flow and sediment loading. Short-term soil exposure and reduced vegetation cover could reduce water infiltration rates and could increase overland flow and sediment loading. Long-term results from vegetation management should improve vegetation cover and infiltration, maintain soil resources, and reduce overland flow and sediment loading, which would improve watershed health. Management actions would not allow mechanical vegetation treatments in fragile soil areas, which could reduce the possibility of performing treatments to stabilize these soils.

Similar to vegetation treatments, managing areas for forest and woodland product harvest would increase overland flow and sediment loading in the short term. However, over the long term, these impacts should be reduced by these actions.

Planned (BLM) or Permitted (BLM-Approved) Actions Requiring Surface Disturbance

Surface disturbing activities could remove vegetation and topsoil, and result in an increase of overland flow and sedimentation. Decreases in vegetation cover generally reduce soil protection from rain, surface runoff, and wind erosion, which could reduce infiltration rates and affect water quality parameters. Several permitted activities (e.g., buried pipeline construction and overhead powerline construction) result in short-term surface disturbance, but reclamation is required to reduce or eliminate long-term impacts on water resources.

Other projects/activities require the soil to be exposed for extended periods of time. To avoid increased sedimentation, BMPs would be implemented. Areas where soils have been compacted to harden the surface (e.g., roads, routes, trails, well pads, and communication sites) have very low infiltration rates, which could lead to high amounts of overland flow. Project design and proper construction can ensure water drainage from the compacted surfaces would not result in significant impacts.

Cross-country OHV use (466,600 acres, 84%) could disturb and reduce surface cover (i.e., soil-stabilizing vegetation, organic litter, rocks, and soil crusts), displace soil particles, and increase soil compaction. These impacts could create new water flow paths and channels, and reduce water infiltration. As infiltration is reduced, new flow paths could be formed from overland water flow. Increased overland flow would erode the displaced soil particles, increasing sediment in water sources.

Applying Stipulations to Surface Disturbing Activities

Applying stipulations on oil and gas exploration and development activities could help protect and maintain current water quality and reduce sedimentation resulting from surface disturbing activities. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (51,200 acres, 9%), areas open to oil and gas leasing subject to major constraints (NSO) (5,500 acres, 1%), and oil and gas areas closed to leasing (75,100 acres, 14% of the decision area) (Map 2-29). The RFD (Appendix I) projects a total of 90 wells (70 exploration and 20 new production wells) could be drilled during the next 20 years, which could result in a future surface disturbance of 2,070 acres and 906 acres of disturbance from seismic operations. Approximately 2,370 acres of the total 2,976 acres would be reclaimed (Appendix I) over the long term. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would help to maintain current water quality and reduce sedimentation.

Areas within 400 feet of identified rivers/creeks are included in the acres open to oil and gas leasing subject to major constraints (NSO). However, this stipulation would apply in the area covered by the Cedar-Beaver-Garfield-Antimony (CBGA) RMP. Not allowing surface occupancy near rivers and creeks would protect stream banks and water quality from surface disturbing activities by restricting actions that could increase sedimentation to nearby streams and rivers.

In addition to oil and gas leasing stipulations, locatable mineral withdrawals, mineral material closures, and restrictions on surface disturbing activities would similarly help protect and maintain current water quality and reduce sedimentation by restricting surface disturbances. The Sand Springs area and Diana's Throne would be recommended for withdrawal from locatable minerals in addition to the 24,591 acres currently withdrawn. Crescent Butte, Shinarump Cliffs, and Vermilion Cliffs recreation sites, and the 40-acre ponderosa pine area would be closed to mineral material disposals. In addition, areas managed as no surface disturbing actions (14,900 acres, 3%) and areas with seasonal limitations on surface disturbing actions (52,300 acres) would further restrict surface disturbing activities (Map 2-43). These actions would help protect existing water quality of the streams and rivers in these areas by retaining vegetation and reducing erosion.

Management protecting the scenic, recreational, botanical, and biological relevant and important (R&I) values within the Water Canyon/South Fork Indian Canyon ACEC (220 acres, <1%) would help protect the water quality and watershed health of the culinary water source. Within this ACEC this water is used by the city of Fredonia, Arizona, as a primary source of culinary water.

Recreation (outside OHV use)

Dispersed recreation activities could have site-specific impacts such as a reduction in plant cover and decreased infiltration rates. Development of recreation facilities in the Moquith Mountain area could result in decreased infiltration rates in some site-specific areas.

Alternative B

Activities on Fragile Soils

Implementing site-specific restrictions and/or mitigations for surface disturbing activities (e.g., open to oil and gas leasing subject to moderate constraints [controlled surface use]) and not allowing cross-country OHV use in fragile soil areas would help minimize the risk of soil erosion and sedimentation. Allowing surface disturbance in fragile soil areas and mitigating impacts would not affect water quality or watershed health. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion and restoring watersheds would help maintain water quality by reducing the amount of sediment loading

from these saline soils to nearby streams from disturbed fragile soil areas. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment.

Planned Actions that Affect Vegetation

Vegetation treatments on an average of no more than 22,300 acres annually would decrease vegetation cover and increase overland flow and sediment loading in the initial year after treatment. Mitigations based on site-specific characteristics, as well as initial growth of desired plant species would reduce these short-term impacts. Over the long term, these treatments should improve vegetation health and cover, which would reduce overland flow and sediment loading. However, if less than an annual average of 4,650 acres were treated, then shrublands would convert into woodlands and reduce understory vegetation. The loss of understory vegetation could, over the long term, increase the susceptibility of resources to erosion, which could increase the potential for an increase in sedimentation and a decrease in water quality.

Impacts from forest and woodland product harvest would be the same as those described in Alternative A.

Designing and implementing grazing systems and range improvements could maintain or improve watershed health and water quality and reduce the likelihood of sediment loading to nearby creeks and springs.

Planned (BLM) or Permitted (BLM-Approved) Actions Requiring Surface Disturbance

Reclamation of surface disturbances should increase plant cover and reduce erosion and sediment loading to nearby streams and rivers. Requiring reclamation of surface disturbances would help maintain water quality and watershed health.

Continuing to implement the *Upper Sevier River Watershed Management Plan* would assist in meeting watershed objectives and minimizing potential impacts on water quality and watershed health.

Managing oil and gas in the areas surrounding the Kanab culinary water wells as open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (approximately 156,700 acres) would help protect surface water and groundwater quality from oil and gas development. In these areas, well placement would be relocated to eliminate potential contamination or pollution sources and design standards would be implemented to prevent contaminated discharges to groundwater.

Applying BMPs to oil and gas activities, designing road crossings to allow fish passage, and incorporating erosion control stipulations in coal mining plans would help to meet watershed objectives, reduce erosion and sediment loading to nearby streams and rivers, and help to maintain water quality.

Encouraging treatment and onsite or offsite beneficial use of produced water from coalbed natural gas (CBNG) activities could protect surface water and groundwater quality and avoid the potential for increased salinity. Not allowing produced water to be discharged in the Colorado River Basin could protect the water quality of the Colorado River and avoid the potential for increased salinity.

Impacts on water resources from cross-country OHV use would nearly be eliminated compared to Alternative A because the number of acres open to use would be only 1,100 acres, mainly in areas with naturally disturbed soils such as sand dunes. Instead of cross-country OHV use, OHV use would be limited to 1,387 miles of designated routes on 524,000 acres (95%). OHV use on designated routes would maintain existing vegetation and soil resources by focusing impacts on existing linear disturbances that have already been affected. Closing 28,900 acres (5%) to OHV use would eliminate OHV-related water impacts in these areas.

Maintaining or improving stream habitat for Bonneville cutthroat trout, roundtail chub, bluehead sucker, and flannelmouth sucker, and restoring riparian habitat for the Southwest willow flycatcher could help maintain water quality in these areas by reducing the amount of sediment entering the stream and by stabilizing stream banks.

Reallocating 48 animal unit months (AUM) to wildlife on the Water Canyon Allotment would help to protect Fredonia's municipal water supply by removing contamination sources.

Applying Stipulations to Surface Disturbing Activities

Increasing stipulations on oil and gas exploration and development activities could help protect and maintain current water quality and reduce sedimentation resulting from surface disturbing activities. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (105,500 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (52,600 acres more than for Alternative A), and areas closed to oil and gas leasing (700 acres more than for Alternative A) (Map 2-30). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would help to maintain current water quality and reduce sedimentation.

Areas within 330 feet of riparian/wetland areas is included in the acres open to oil and gas leasing subject to major constraints (NSO). This restriction, though 70 feet less than for Alternative A, would be applied to riparian/wetland areas throughout the decision area, not only to the area within the CBGA RMP as in Alternative A. Not allowing surface occupancy near riparian/wetland areas would protect stream banks and water quality from surface disturbing activities by retaining vegetation that would help trap sediment before it reaches nearby streams and rivers.

In addition to oil and gas leasing stipulations, stipulations on locatable mineral withdrawals (9,500 acres) and mineral material closures (78,500 aces) would similarly help protect and maintain current water quality and reduce sedimentation by restricting surface disturbances. The Cottonwood Canyon ACEC and suitable WSR corridors would be recommended for withdrawal from locatable minerals (Map 2-23) and closed to mineral material disposals (Map 2-34). In addition, areas managed as no surface disturbing actions (4,800 acres more than for Alternative A) and areas with seasonal limitations on surface disturbing actions (133,400 acres more than for Alternative A) would further restrict surface disturbing activities (Map 2-44). These actions would help protect existing water quality of the streams and rivers in these areas by retaining vegetation and reducing erosion.

Management protecting the scenic and cultural R&I values within the Cottonwood Canyon ACEC (3,800 acres, <1%) would help protect the water quality and watershed health of the culinary water source by reducing the possibility of surface disturbing activities and limiting contamination and pollution sources. Within this ACEC this water is used by the city of Fredonia, Arizona, as a primary source of culinary water.

Recreation (outside OHV use)

Identification of and development within SRMAs (125,800 acres, 23%) could result in soil compaction or reduction of vegetation cover in some areas, which could result in increased overland flow and sediment loading to nearby streams and rivers. These impacts would be more likely in SRMAs with motorized activities. In SRMAs with non-motorized activities, the impacts would be more site specific in areas of concentrated use. Increasing the frequency of patrols in SRMAs and public education could decrease associated recreation impacts on water quality.

Dispersed recreation activities and SRPs could have site-specific impacts such as a reduction in plant cover and soil compaction in small, localized, and isolated areas, which would result in a small increase in overland flow and sediment loading to nearby streams and rivers. However, restrictions attached to SRPs would minimize these impacts on water resources.

Alternative C

Activities on Fragile Soils

Precluding surface disturbing activities (e.g., open to oil and gas leasing subject to major constraints [NSO]) and not allowing cross-country OHV use in fragile soil areas could help protect and maintain fragile soil resources. The protection of fragile soils could maintain existing water quality and watershed health by minimizing the risk of soil erosion and sedimentation to nearby streams and rivers from disturbed fragile soil areas. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion and restoring watersheds would help maintain water quality by reducing the amount of sediment loading from these saline soils to nearby streams from disturbed fragile soil areas. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment.

Planned Actions that Affect Vegetation

Impacts from implementing vegetation treatments would be greater than those described for Alternative A. Implementing vegetation treatments on an annual average of at least 4,650 (93,000 acres over the life of the plan), not to exceed an annual average of 22,300 acres (446,000 over the life of the plan), and using preferred treatment methods that mimic natural process (e.g., prescribed fire, biological, and hand cutting) likely would result in a slower process of vegetation enhancement. The slower rate of vegetation enhancement could result in the soil surface being exposed over a longer period of time, which could reduce water infiltration rates and increase overland flow and sedimentation. Mitigations based on site-specific soil characteristics, as well as initial growth of desired plant species would reduce these short-term impacts. Over the long term, treatments should improve vegetation health and cover, maintain soil resources, and reduce overland flow and sediment loading.

Closing riparian areas and WC areas to woodland products harvest could help maintain existing water quality conditions. Short-term impacts, such as increased overland flow and sediment loading due to timber and woodland product harvest, would not occur.

Designing and implementing grazing systems and range improvements could maintain or improve watershed health and water quality and reduce the likelihood of sediment loading to nearby creeks and springs.

Planned (BLM) or Permitted (BLM-Approved) Actions Requiring Surface Disturbance

Reclamation of surface disturbances should increase plant cover and reduce erosion and sediment loading to nearby streams and rivers. Requiring reclamation of surface disturbances could help maintain water quality and watershed health.

Managing oil and gas in the areas surrounding the Kanab culinary water wells as open to leasing subject to major constraints (NSO) (approximately 5,800 acres) would protect surface water and groundwater quality from oil and gas development.

Applying BMPs to oil and gas activities and road crossings would help to meet watershed objectives, reduce erosion and sediment loading to nearby streams and rivers, and help to maintain water quality.

Encouraging treatment and onsite beneficial use of produced water could help protect surface water and groundwater quality in the watershed and avoid the potential for increased salinity in the watershed.

Not allowing produced water to be discharged in the Colorado River Basin could help preserve water quality in the Colorado River and avoid the potential for increased salinity. This alternative would provide the greatest protection of water quality in the Colorado River.

Impacts on water resources from cross-country OHV use would be eliminated because no acres would be open to such use. OHV use would be limited to 1,190 miles of designated routes on 388,300 acres (70%). OHV use on designated routes would maintain existing vegetation and soil resources by focusing impacts on existing linear disturbances that have already been affected. Closing 165,700 acres (30%) to OHV use would eliminate OHV-related impacts on water in these areas.

Maintaining or improving stream habitat for Bonneville cutthroat trout, roundtail chub, bluehead sucker, and flannelmouth sucker and restoring riparian habitat for the Southwest willow flycatcher could help to maintain water quality in these areas.

Applying Stipulations to Surface Disturbing Activities

Alternative C would be the most restrictive on oil and gas development, and would provide the greatest protection for water resources. Further increasing stipulations on oil and gas exploration and development activities could help protect and maintain current water quality and minimize erosion and sedimentation. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (218,700 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (77,600 acres more than Alternative for A), and areas closed to oil and gas leasing (97,500 acres more than for Alternative A) (Map 2-31). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would help to maintain current water quality and reduce sedimentation.

Areas within 660 feet of riparian/wetland areas are included in the acres open to oil and gas leasing subject to major constraints (NSO). Not allowing surface occupancy near riparian/wetland areas would protect stream banks and water quality from surface disturbing activities by retaining vegetation that would help trap sediment before it reaches nearby streams and rivers. Alternative C would be the most restrictive on oil and gas leasing near riparian/wetland areas.

In addition to oil and gas leasing stipulations, stipulations on locatable mineral withdrawals (158,800 acres) and mineral material closures (175,000 acres) would similarly help protect and maintain current water quality and reduce sedimentation by restricting surface disturbances. WC areas, ACEC, WSR, and SRMA management actions would recommend areas for withdrawal from locatable mineral entry (158,800 acres, 29%) (Map 2-24). WC areas, WSA, ACEC, WSR, and SRMA management actions would close areas to mineral material sales (175,000 acres, 32%) (Map 2-35). In addition, areas managed as no surface disturbing actions (17,800 acres more than for Alternative A), and areas with seasonal limitations on surface disturbing actions (414,100 acres more than for Alternative A) would further restrict surface disturbing activities (Map 2-45). These actions would help protect the existing water quality of the streams and rivers in these areas by retaining vegetation and reducing erosion.

Impacts on culinary water sources from ACEC management actions to protect the R&I values of the Cottonwood Canyon ACEC (3,800 acres, <1%) would be the same as described for Alternative B.

Recreation (outside OHV use)

Identification of and development within SRMAs (129,050 acres or 23%) could result in soil compaction or reduction of vegetation cover in some areas, which could result in increased overland flow and sediment loading to nearby streams and rivers. Increasing the frequency of patrols in SRMAs and public education could decrease associated recreation impacts on water quality.

Impacts from dispersed recreation activities and SRPs would be the same as described in Alternative B.

Alternative D

Activities on Fragile Soils

Allowing surface disturbance on fragile soils could decrease vegetation cover and increase sediment loading, salinity, and turbidity to nearby streams. Not allowing cross-country OHV use in fragile soil areas would help protect and maintain fragile soil resources. The protection of these saline soils would help maintain water quality and watershed health by limiting the amount of erosion and sediment and salt loading of nearby streams and rivers from disturbed fragile soil areas. In addition, there is a greater risk of some loss of soil productivity on all 6,290 acres (almost 100% of fragile soils) of fragile soils that would be open to oil and gas leasing subject to standard terms and conditions or open subject to moderate constraints. The terms and conditions, as well as the timing limitations may not provide the measures needed to protect or restore disturbance in these areas due to inherent soil vulnerability. Prioritizing land treatments in fragile soil areas with the objective of reducing erosion and restoring watersheds would help maintain water quality by reducing the amount of sediment loading from these saline soils to nearby streams from disturbed fragile soil areas. Over 80 percent of the areas with identified fragile soils (5,100 acres) would be prioritized for such treatment.

Planned Actions that Affect Vegetation

Impacts from vegetation treatments would be the same as those described in Alternative B. Impacts from forest and woodland product harvest would be the same as described in Alternative A.

Designing and implementing grazing systems and range improvements could maintain or improve watershed health and water quality and reduce the likelihood of sediment loading to nearby creeks and springs.

Planned (BLM) or Permitted (BLM-Approved) Actions Requiring Surface Disturbance

Reclamation of land subject to surface disturbances should increase plant cover and reduce erosion and sediment loading to nearby streams and rivers. Requiring reclamation of disturbed land surfaces should maintain water quality and watershed health.

Managing oil and gas in the areas surrounding the Kanab culinary water wells as open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (approximately 5,800 acres) would have the same impact as under Alternative B.

Applying BMPs to oil and gas activities and road crossings would help meet watershed objectives, reduce erosion and sediment loading to nearby streams and rivers, and help to maintain water quality.

Allowing produced water to be disposed of in a manner approved by the State would help maintain current surface water and groundwater quality.

Allowing surface discharge of produced water that meets State standards for water quality in the Colorado River Basin could increase flow rates. Surface discharge of produced water could modify stream channel morphology.

Impacts on water resources from cross-country OHV use would nearly be eliminated compared to Alternative A because the number of acres open to OHV use would be only 1,100 acres, mainly in areas with naturally disturbed soils such as sand dunes and ephemeral washes. Instead of cross-country OHV use, OHV use would be limited to 1,464 miles of designated routes on 525,300 acres (95%). OHV use on designated routes would maintain existing vegetation and soil resources by focusing impacts on existing linear disturbances that have already been affected. Closing 27,600 acres (5%) to OHV use would eliminate OHV-related water impacts in these areas.

Maintaining or improving stream habitat for Bonneville cutthroat trout, roundtail chub, bluehead sucker, and flannelmouth sucker and restoring riparian habitat for the Southwest willow flycatcher could help to maintain water quality in these areas.

Applying Stipulations to Surface Disturbing Activities

Alternative D would be less restrictive on oil and gas exploration and development activities compared to Alternatives B and C, but more restrictive than Alternative A. Stipulations on oil and gas exploration and development activities could help protect and maintain current water quality and minimize erosion and sedimentation. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (13,400 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (17,500 acres more than for Alternative A), and closing areas to oil and gas leasing (75,100 acres, the same as for Alternative A) (Map 2-32). The RFD (Appendix I) projects that the number of oil and gas wells that could be drilled would be the same as for Alternative A. Applying BMPs identified in Appendix A, such as promptly reclaiming disturbed areas and establishing vegetation cover on disturbed areas, would help to maintain current water quality and reduce sedimentation.

Areas within 330 feet of riparian/wetland areas are included in the acres open to oil and gas leasing subject to major constraints (NSO). The impacts from this decision would be the same as for Alternative B.

In addition to oil and gas leasing stipulations, stipulations on locatable mineral withdrawals (7 acres) and mineral material closures (21,200 acres) would similarly help protect and maintain current water quality and reduce sedimentation by restricting surface disturbances. Areas managed as no surface disturbing actions (4,800 acres more than for Alternative A) and areas with seasonal limitations on surface disturbing actions (19,500 acres more than for Alternative A) would further restrict surface disturbing activities (Map 2-46). These actions would help protect the existing water quality of the streams and rivers in these areas by retaining vegetation and reducing erosion.

Recreation (outside OHV use)

Identification of and development within SRMAs (122,800 acres or 22%) could result in soil compaction or reduction of vegetation cover in some areas, which could result in increased overland flow and sediment loading to nearby streams and rivers. These impacts would be more likely in SRMAs with motorized activities. In SRMAs with non-motorized activities, the impacts would be more site specific in areas of concentrated use. Increasing the frequency of patrols in SRMAs and public education could decrease associated recreation impacts on water quality.

Impacts from dispersed recreation activities and SRPs would be the same as described in Alternative B.

Summary

Surface disturbing activities could reduce watershed health and water quality. Management actions that limit surface disturbing activities or implement BMPs and mitigation measures could protect and maintain current water quality and minimize erosion and sedimentation. Alternative B would place more restrictions on surface disturbing activities and help protect soil resources more than Alternative A or Alternative D. Alternative C management actions would place the greatest restrictions on surface disturbing activities and thus provide the greatest amount of protection for water resources. In addition, Alternatives B, C, and D would improve watershed health from watershed restoration and vegetation treatments, improving vegetation and decreasing soil loss and water quality.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of water resources under any of the alternatives. Long-term impacts on water quality and watershed health could be restored.

Short-term use of an area to accommodate energy and minerals, ROWs, and cross-country OHV use could result in site-specific increases in sedimentation that could affect water quality and water resources. The limited extent of foreseeable development, mitigating management actions, and application of BMPs would minimize decreases in long-term productivity from short-term uses.

Surface disturbing activities could result in unavoidable adverse impacts, although these impacts could be decreased by applying BMPs and site-specific mitigation efforts.

4.2.4 Impacts on Vegetation

This analysis addresses potential impacts on vegetation (consisting of upland vegetation, riparian/wetland, and forests and woodlands) from implementing the management actions under the alternatives described in Chapter 2. This analysis focuses on those management alternatives or actions that have the potential to directly or indirectly disturb or remove vegetation that could result in a reduction or loss of structure, function, or diversity within a vegetation community, or that have the potential to facilitate the establishment and enhancement of vegetation communities.

Upland vegetation communities include oak/mountain shrub (15,100 acres), desert scrub (22,300 acres), and sagebrush steppe (145,900 acres), which together comprise 34% of the decision area. Riparian/wetlands communities comprise 70 miles and 390 acres within the decision area. Forest and woodland communities include aspen (350 acres), mixed conifer (550 acres), ponderosa pine (4,200 acres), and pinyon-juniper woodland (324,800 acres), which together comprise 60% of the decision area.

The effects of management actions on upland vegetation, riparian/wetland areas, and forests and woodlands may vary widely, depending on a variety of factors such as the type of soils, moisture, topography, and plant reproductive characteristics. Impacts on vegetation resources also vary depending on the seral stage and composition of the vegetation communities discussed in Chapter 3. The composition of a plant community changes over time as a result of interactions with a variety of factors, such as climate, resource uses, and disturbance. Surface disturbance can result in the most immediate direct impact on an area by removing existing vegetation and thus increasing opportunities for establishment of noxious weeds and invasive species. This could in turn reduce vegetation diversity, production, desirable plant cover, and overall ecological health of vegetation communities. Decreased ecological health would make vegetation communities less resilient to disease, drought, fire, invasive species invasion, and other natural disturbances/stressors. Indirectly, surface disturbance could increase erosion rates, modify soil composition, and alter water flow patterns across the landscape. On the contrary, implementing vegetation treatments (mechanical, fire, biological, and chemical), managing vegetation/ecological resources to meet desired vegetation conditions, and limiting or restricting surface disturbances could generally improve vegetation/ecological conditions. Although short-term losses of vegetation cover would occur, over the long term these actions would help remove undesirable species, increase species diversity and age class, improve vegetation composition and structure, and increase vegetation cover and ecological condition. This would result in healthier vegetation communities that are more capable of retaining moisture and nutrients and resisting disease, invasive species invasion, drought, and other natural disturbances/stressors.

The analysis is based on the following assumptions:

- Adequate vegetative ground cover and species composition for site stabilization would typically occur within 5 to 10 years in sagebrush/grass communities, depending on climate, soil, and site potential.
- Plant communities would be managed toward achieving a mix of species composition, cover, and age classes.
- The degree of impact attributed to any one disturbance or series of disturbances would be affected by several factors, including location within the watershed, the type, time, and degree of disturbance, existing vegetation, and precipitation.
- Noxious and invasive weeds would continue to try and invade and spread as a result of surface disturbing activities, vehicle traffic, recreational activities, wildlife and livestock grazing, and natural causes.
- Weed and pest control would be carried out in coordination with the appropriate county, public, and private interests.

- Climatic fluctuation would continue to affect the health and productivity of plant communities on an annual basis.

The analysis of vegetation, which includes structure, productivity, vigor, percent cover, density, and species composition, was based on likely changes relative to movement toward or away from desired vegetation conditions. In the absence of quantitative data, professional judgment was used, and impacts are sometimes described using ranges of potential impacts or using qualitative terms, if appropriate. Particular emphasis was on vegetation communities with the greatest sensitivity to changes in structure and species composition, and most at risk from potentially severe mortality events such as drought, insects, and disease infestation.

Under all alternatives, impacts on vegetation would not be anticipated as a result of implementing management actions for the following resources and designations: air quality, cultural resources, paleontological resources, and other designations.

Impacts Common to All Alternatives

Surface Uses

Grazing by livestock and/or wildlife can alter upland vegetation communities by removing portions of plants (degree of alteration would depend on the extent of the removal), length of grazing period, and climatic conditions. Grazing animals' hooves could trample plants and compact soils from concentrated use. Grazing by livestock and/or wildlife can lead to trampling and/or removal of seedlings and understory vegetation and could hinder regeneration and diversity within forests and woodlands. Concentrated grazing can alter vegetation structure and species composition (Kimball and Schiffman 2003, Howery 1999). Managing livestock grazing according to the Standards and Guidelines would eliminate long-term impacts from concentrated livestock use. Trampling and altered vegetation structure would decrease, resulting in vegetation communities that are meeting or moving toward ecological site potential.

Proper grazing could improve the ecological conditions of upland communities by reducing vegetation removal, decreasing erosion, and reducing opportunities for establishment of noxious weeds and invasive species. In riparian areas, monitoring grazing use and making adjustments could maintain or improve ecological condition of riparian/wetland communities by reducing vegetation removal, decreasing erosion, and reducing opportunities for establishment of noxious weeds and invasive species. In forests and woodlands, monitoring grazing use and making adjustments could also minimize excessive removal of vegetation if it inhibits diversity and regeneration.

Using livestock grazing to enhance ecosystem health and/or help accomplish resource objectives on allotments (e.g., noxious/invasive weed control and hazardous fuel reduction) on a case-by-case basis could maintain and/or improve upland vegetation conditions and reduce cheatgrass and other invasive weeds. In forests and woodlands, this action would reduce fuel loads and noxious and invasive weeds, leading to improved health of these communities.

Land exchanges and disposals could reduce fragmentation of BLM-administered lands. This could improve the BLM's ability to implement management actions that result in increased diversity or that improve ecological health of upland communities, riparian/wetland areas, and forests and woodlands.

Limits or Restrictions on Surface Uses and Disturbances

Implementing BMPs to minimize detrimental impacts on soils and water quality from ground disturbing activities and maintaining and/or enhancing riparian areas through project design features and/or

stipulations would help to reduce soil erosion, surface runoff, and sedimentation of streams. This would help to maintain or improve upland vegetation and riparian/wetland communities. Making necessary management adjustments to meet watershed objectives (e.g., *Upper Sevier River Watershed Management Plan*, *Standards for Rangeland Health*, and *Utah Riparian Management Policy* [UT 2005-091]) and protecting municipal water supplies through restricting OHV and livestock grazing where necessary in key watershed areas generally would maintain or improve upland vegetation and riparian/wetland communities and reduce trampling and/or removal of understory vegetation in key watershed areas.

Incorporating design and operation stipulations on new or amended ROWs as necessary to protect riparian and aquatic resources, and to monitor riparian conditions, as needed, for any surface disturbing activity would maintain or improve upland vegetation conditions and riparian/wetland communities, and could reduce removal of vegetation.

Vegetation Management and Habitat Manipulation

Management of vegetation resources generally would enhance upland communities, riparian/wetland communities, and forests and woodlands. Continued implementation of noxious weed and invasive species control actions to prevent and control their spread would reduce competition with desirable plant species and help maintain or improve the health of these three vegetation communities. Applying the *Standards for Rangeland Health* to all uses in management of rangelands would help manage surface uses properly and help maintain or improve vegetation conditions.

Habitat improvements for special status species and fish and wildlife could maintain or improve vegetation conditions. However, surface disturbance restrictions intended to protect special status species and fish and wildlife, such as prohibiting disruptive activities within ½ mile of bald eagle nests and Mexican spotted owl nests, could also restrict opportunities for vegetation treatments, including fire use, but applying exceptions, waivers, or modifications to treatments (Appendix C) could allow treatments that improve habitat.

Wildland Fire

Using wildland fire and prescribed fire to protect, maintain and enhance resources could help improve vegetation conditions. Frequent, low-intensity fires are necessary to rejuvenate aspen stands, minimize understory fuel loads that could otherwise lead to larger crown fires, and minimize pinyon-juniper encroachment. Fire use through an AMR would also reduce the occurrence of catastrophic fires and stand-replacing fires and thereby help to maintain desired vegetation cover. Fire use would help increase vegetative diversity and resistance to disease and insect pest infestations because it would help improve the ecological health of treated vegetation communities. This type of fire management could decrease the risk of establishment of noxious weeds and invasive plant species over the long term.

Suppressing wildland fires in upland and riparian communities could limit fire from functioning in its natural role, which could reduce resistance to disease and insect pest infestations and increase the risk of uncharacteristically large or intense wildfires that could alter upland and riparian communities. In forest and woodland communities, suppressing wildland fire can alter natural disturbance regimes, which in turn can alter the distribution and health of aspen, ponderosa pine, and pinyon-juniper woodlands. This could also reduce resistance to disease, insect pest infestations, and increases the risk of stand-replacing wildfire. However, using non-fire fuels treatments could reduce the potential for these impacts to occur. Although suppression actions can create surface disturbances and removal of vegetation, implementing ESR actions after suppression activities could help to mitigate these impacts and foster regeneration of desired communities.

Alternative A

Surface Uses and Disturbances

Surface use and disturbances could adversely affect vegetation and the ecological health of upland communities, forests and woodlands, and riparian areas by removing vegetation components of the communities. Disturbances could increase the extent of exposed soil, which could increase surface runoff and the movement of soil and nutrients necessary for plant survival. Such disturbances could also alter the composition and structure of vegetation communities, increase the potential for the introduction and establishment of noxious weeds, and reduce species diversity, primary production, and recruitment of new plants. This, in turn, could make upland, riparian, and forest and woodland communities less resilient to disease, drought, fire, invasive species, and other natural disturbances/stressors.

Continuing to manage federal mineral estate with 422,200 acres (76%) as open to oil and gas exploration and development to the standard terms and conditions, the entire decision area (554,000 acres) as open for mineral material sales, 529,400 acres (96%) as open for locatable mineral exploration, and 466,600 acres (84%) as open to cross-country OHV recreation use could lead to surface disturbance in these vegetation communities. Surface disturbing activities associated with development of leasable, locatable, and salable minerals would disturb soils, remove vegetation, and increase the potential for the introduction and spread of noxious weeds. The initial surface disturbance from mineral exploration activities combined with the development of roads, pipelines, and drill pads per well pad would amount to 23 acres during the planning horizon (Appendix I). Although about 80 percent of the initial disturbance area would be reclaimed within the planning horizon, approximately 20 percent of the disturbed area would be devoid of vegetation for the life of the well. Areas disturbed and then reclaimed would increase the amount of early successional vegetation in these communities. The improvement of roads associated with mineral development would also remove vegetation. Increased vehicle travel to well pads could increase the spread of noxious weeds. Anticipated mineral exploration and development of 90 oil and gas wells would result in an estimated 2,976 acres (2% of upland vegetation within the decision area) of initial surface disturbance over the 20-year planning horizon. After reclamation, the amount of disturbance area would be reduced to 607 acres, which represents the anticipated amount of long-term surface disturbance. The long-term disturbance of 607 acres would result in relatively minor impacts on vegetation, because it would comprise only 0.3 percent of upland vegetation within the decision area.

Managing riparian areas from all surface uses and disturbances through protective stipulations and not allowing occupancy or other surface disturbance within 400 feet of rivers and creeks would minimize the potential for these impacts from surface disturbance to riparian/wetland communities. Monitoring riparian conditions, as needed, for any surface uses that could affect riparian areas would ensure that appropriate actions to protect these vegetation communities are taken before functioning conditions become impaired.

The development of coal resources would be anticipated to result in the total disturbance of 3,600 acres (2% of upland vegetation within the decision area) over the 20-year planning horizon, which would result in temporary vegetation removal in these areas. However, because reclamation is estimated to occur concurrently with mining, the long-term disturbance would result in relatively minor impacts on vegetation.

Construction of powerlines and pipeline ROWs would remove vegetation in localized areas over the short term and increase the potential for the introduction of noxious weeds. Increased vehicle travel on new roads would also increase the potential for the spread of weeds. The entire decision area would be available for ROW development and subject to these impacts.

Recreational activities that are concentrated, occur in frequently used areas, or involve use of mechanized or motorized equipment (e.g., OHVs) could trample and remove vegetation, leading to increased soil

erosion, surface runoff, and degradation of upland and riparian communities. Recreational activities could also contribute to the introduction and spread of noxious weeds and invasive plant species, which could be transported on shoes, pets, and/or vehicles. Motorized or mechanized vehicles and equipment (e.g., OHVs) could damage and remove vegetation and increase dust levels in high-use areas, which would cause dust coating of vegetation or susceptibility to noxious or invasive species.

The commercial harvest of forest and woodland products and associated surface disturbances would remove seedlings, understory vegetation, and mature trees where harvest occurs. Protecting riparian areas from all surface uses and disturbances through protective stipulations and not allowing occupancy or other surface disturbance within 400 feet of rivers and creeks would minimize the potential for these impacts on riparian/wetland communities. Monitoring riparian conditions, as needed, for any surface uses that could affect riparian areas would help ensure that appropriate action to protect these vegetation communities are taken before functioning conditions become impaired. Over the long term, the harvest of forest and woodland products would increase penetration of light to understory vegetation (i.e., grasses and forbs) and could also increase diversity, composition, and structure, reduce fuel loads, and maintain a variety of successional stages. This, in turn, would make forests and woodlands more resilient to disease, drought, fire, invasion by non-native species, and other natural disturbances/stressors.

Limits or Restrictions on Surface Uses and Disturbances

Restricting surface disturbing activities would help retain existing upland communities, existing riparian/wetland vegetation, and existing woodland and forest. Management of fish and wildlife habitat, special status species, water resources, soil resources, special designations (e.g., WSAs, ACECs, and wilderness), and visual resources would help provide for the protection, enhancement, and restoration of desirable vegetation resources. Such management generally would include actions that restrict construction activities and other surface disturbances, which could indirectly increase plant species diversity and age class, improve vegetation composition and structure, and increase vegetation cover. This should result in healthier upland communities that are more capable of retaining moisture and nutrients and of resisting disease, invasion of non-native species, drought, and other natural disturbances/stressors. Under this alternative, management actions that restrict surface disturbing activities include continuing to close areas to oil and gas leasing (75,100 acres, 14%), manage areas as NSO (5,500 acres, 1%), retain existing locatable mineral withdrawals (24,591 acres, 4%), and close areas to OHV recreation use (21,200 acres, 4%). To protect special status species, no surface disturbing actions would be allowed on 14,900 acres (3%), thus reducing associated impacts on upland communities.

In riparian areas, continuing to make necessary adjustments to grazing, restricting motorized vehicle use to existing roads (66,200 acres, 12%), not allowing lease operations or sale of mineral materials, requiring protective stipulations on any actions taken under land and minerals decisions, and not allowing occupancy or other surface disturbance within 400 feet of the identified rivers and creeks generally would maintain riparian/wetland vegetation and reduce soil erosion and runoff near water sources. This would help to maintain and enhance riparian/wetland communities and adjacent upland vegetation communities.

Management prescriptions associated with ACECs would restrict surface uses that could otherwise result in vegetation removal and degradation. Continuing to manage the Water Canyon/South Fork Indian Canyon ACEC (220 acres) as a VRM Class II area and requiring NSO stipulations on new leases would reduce the extent of surface disturbance in the ACEC and thereby reduce related vegetation removal and disturbance.

Managing visual resources on the basis of VRM Class objectives would reduce the extent of surface disturbance in VRM Class I and II areas and thereby reduce related vegetation removal and disturbance in upland, riparian, and forest and woodland communities. Under this alternative, 21,200 acres (4%) would be managed as VRM Class I, and 99,900 acres (18%) would be managed as VRM Class II. However, the

management of visual resource could constrain vegetation treatments, including fire use, treatment methods, and the size of the treatments, in these areas.

Management of river segments to protect their outstandingly remarkable values (ORV), free-flowing nature, and tentative classification would include surface use restrictions. Such restrictions would reduce surface disturbance and related vegetation removal, and thereby help to maintain existing upland and riparian/wetland communities. Under Alternative A, all 15 eligible river corridors (9,230 acres, 2%) would be protected on a case-by-case basis.

Vegetation Management and Habitat Manipulation

Implementing vegetation treatments (e.g., mechanical, fire, biological, and chemical) and managing vegetation resources to meet desired vegetation conditions would help maintain or improve vegetation communities. In the short term, surface disturbance and vegetation removal could increase opportunities for establishment of noxious weeds and invasive species and could remove understory vegetation. Protecting riparian areas from all surface uses and disturbances through protective stipulations would minimize the potential for impacts on riparian/wetland communities during treatment. Over the long term, vegetation treatments could remove undesired species, increase species diversity and age class, improve vegetation composition and structure, and increase vegetation cover. Over the long term, vegetation treatments in forests and woodlands could reduce fuel loads, promote aspen regeneration, decrease pinyon-juniper encroachment, improve vegetation composition and structure, and increase vegetation cover. This should result in healthier upland and riparian communities and forest and woodlands that are more capable of retaining moisture and nutrients and resisting disease, invasive species, drought, and other natural disturbances/stressors. Areas in which vegetation treatments were not successful could be invaded by weed species and/or become established with other undesired vegetation, which would reduce the health of the upland communities over the long term. Implementing general treatment stipulations, such as using prescribed burning in lieu of mechanical treatment when deemed suitable, evaluating treatment sites for soil suitability and stability prior to manipulation, and excluding livestock from all treatment areas until seedlings are established, would help facilitate reestablishment of vegetation communities. Using desired species of grasses, forbs, and browse in the rehabilitation and reseeding of treated areas would facilitate vegetation reestablishment and avoid creating single-species communities. Vegetation treatments under this alternative would not be conducted in areas containing ponderosa pine, which would allow the understory in these areas to increase in shrubs and trees and reduce the percent cover of grass/forb communities in the understory.

Vegetation treatments could improve watershed health, reduce soil loss, and enhance forage vegetation conditions. Implementing erosion control measures in frail watershed areas would help reduce short-term impacts such as soil erosion, surface runoff, and sedimentation of water sources. These vegetation treatments would help to reestablish upland communities, maintain or improve the health of riparian/wetland communities, reestablish seedlings and understory vegetation, and retain soil moisture and nutrients in forests and woodlands.

Alternative B

Surface Uses and Disturbances

The magnitude of impacts from surface uses and disturbances associated with oil and gas, coal, minerals, and OHV recreation use would decrease compared to Alternative A. Surface uses and disturbances would be more restricted in Alternative B, would more likely occur in the following: areas open to oil and gas leasing subject to standard terms and conditions (158,800 acres less than for Alternative A), areas open for mineral material sales (475,500 acres, 86%), areas open to locatable mineral entry (519,900 acres, 94%), and areas open to cross-country OHV recreation use (1,100 acres, 0.2%). Impacts from the short-

and long-term disturbances associated with oil and gas wells and coal development would be the same as for Alternative A.

The magnitude of impacts from the development of ROWs would decrease compared to Alternative A. Approximately 399,400 acres (72%) would be available for ROW development, which could decrease the extent of related vegetation removal associated with these activities. Collocating ROWs would further reduce surface disturbances and removal of vegetation. In addition, surface disturbance would not be allowed within 330 feet of riparian/wetland areas and in-kind offsite compensatory mitigation would be implemented on a site-specific basis for oil and gas authorizations and energy ROWs, which would minimize and mitigate these impacts on riparian/wetland communities.

The type of impacts from recreation management would be the same as for Alternative A, but the magnitude of the impacts would decrease because SRMA management actions would help to reduce impacts from recreational opportunities. Management of the Kanab Community SRMA (OHV Recreation Management Zone [RMZ]), Paria SRMA (Canyons RMZ), Moquith Mountain SRMA, Parunuweap SRMA (motorized canyon RMZ), Orderville Canyon SRMA, North Fork Virgin River SRMA, and Escalante SRMA (64,600 total acres, 11%) would further emphasize recreational opportunities and consequently increase the potential for vegetation removal. However, implementing surface use restrictions within the SRMAs and increasing the management of these areas would help to reduce the degree of impact from recreational and other uses. Encouraging primitive types of recreation and prohibiting surface disturbance from oil and gas development in the Kanab Community SRMA (non-motorized RMZ), Paria SRMA (uplands RMZ), Parunuweap SRMA (non-motorized RMZ and uplands RMZ), Orderville Canyon SRMA, and North Fork Virgin River SRMA (66,200 total acres, 12%) would help to reduce impacts on vegetation communities from recreational use.

Impacts from managing commercial timber and woodland harvest would be the same as for Alternative A. Not allowing surface disturbance within 330 feet of riparian/wetland areas would minimize the potential for these impacts on riparian/wetland communities.

Limits or Restrictions on Surface Uses and Disturbances

The magnitude and intensity of the impacts from surface disturbing activities in Alternative A could decrease in Alternative B based on more restrictions and stipulations on surface disturbing activities. Management actions for resources and resource uses that apply stipulations to surface disturbing activities could help maintain or improve upland, riparian, and forest and woodland conditions. These management actions include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (105,500 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (52,600 acres more than for Alternative A), and areas closed to oil and gas leasing (700 acres more than Alternative A) (Map 2-30).

In addition to oil and gas leasing stipulations, stipulations on locatable mineral withdrawals (9,500 acres) and mineral material closures (78,500 aces) could similarly help maintain or improve upland, riparian, and forest and woodland conditions. The Cottonwood Canyon ACEC and suitable WSR corridors would be recommended for withdrawal from locatable minerals (Map 2-23) and closed to mineral material disposals (Map 2-34). In addition, areas managed as no surface disturbing actions (4,800 acres more than for Alternative A), areas with seasonal limitations on surface disturbing actions (133,400 acres more than for Alternative A) (Map 2-44), ROW exclusion areas (75,700 acres, 14%) (Map 2-20), and areas closed to OHV recreation use (7,700 acres more than for Alternative A) would further restrict surface disturbing activities. These restrictions would help reduce associated impacts on upland vegetation, riparian/wetland communities, and forests and woodlands compared to Alternative A.

Management of special status species could affect vegetation though habitat improvements and land use restrictions. Controlling surface disturbing and disruptive activities to minimize impacts on identified crucial habitat for sensitive species, applying BMPs to avoid or reduce habitat fragmentation, prohibiting surface disturbing activities within ½ mile of active or suitable Utah prairie dog habitat, applying a CSU stipulation to relocate well placement in federally listed and candidate plant species occupied and suitable habitat, and applying an NSO stipulation within ½ mile of Greater sage-grouse leks would all help to maintain or improve upland, riparian, and forest and woodland conditions. These actions could also constrain vegetation treatments (including fire use), treatment methods, and size of the treatment; however, applying exceptions, waivers, or modifications to treatments (Appendix C) could allow treatments that improve habitat. Maintaining or improving stream habitat in special status fish habitat would help to maintain or improve the composition and vegetation cover in upland and riparian communities.

Cross-country OHV use would be precluded in fragile soil areas and additional efforts would be conducted to reclaim areas subject to surface disturbances and temporary roads. This would further reduce soil erosion and maintain or improve upland and riparian communities.

Implementing mitigation measures to minimize impacts on water quality and prohibiting surface discharge of produced water in the Colorado River Basin would reduce soil and salt loads to water sources and help maintain appropriate stream discharge rates. This would in turn maintain or enhance the composition of upland and riparian communities. Not allowing new surface disturbing activities within 330 feet of riparian/wetland areas generally would maintain or improve upland and riparian vegetation conditions.

Implementing additional measures to manage and improve vegetation, including managing vegetation resources to achieve 51 percent or more of the potential natural community and using the full range of vegetation treatment methods and tools, could improve vegetation health compared to Alternative A. Vegetation resources would be managed to achieve 51 percent or more of the potential natural community, which would create a target for rehabilitation efforts that could increase the extent of successfully rehabilitated areas. Restoring forest and woodland old-growth stands to a pre-fire–suppression condition could increase tree spacing and encourage understory vegetation in these areas.

VRM Class I areas would increase to 76,000 acres (14%) and VRM Class II areas would increase to 93,600 acres (17%) under Alternative B. This would further reduce the extent of surface disturbance and thereby reduce related surface and vegetative disturbance.

Management prescriptions associated with ACECs would restrict surface uses that could otherwise result in removal and disturbance of vegetation. Managing the Cottonwood Canyon ACEC (3,800 acres) as a VRM Class II area and requiring NSO stipulations on new oil and gas leases would reduce the extent of surface disturbance in the ACEC in upland and riparian communities and forests and woodlands.

Managing WSRs would have benefits similar to those described in Alternative A, except on 2,920 fewer acres. Only 7 eligible river segments (6,310 acres of river corridors, 1%) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Vegetation Management and Habitat Manipulation

Vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, livestock rangeland treatments, fuels treatments, and stewardship contracting) on an annual average of no more than 22,300 acres (446,000 acres over the life of the plan), using the full range of vegetation treatment methods and tools (i.e., prescribed fire, mechanical, chemical, biological, woodland product removal, and wildland fire use) would help maintain or improve the health of vegetation communities. Prioritizing treatments to

restore areas functioning at less than 51 percent of the potential natural community (PNC), restore areas with noxious weeds and/or invasive plants, maintain previously treated areas, and achieve other objectives identified in this RMP likely would further improve vegetation conditions in upland areas and riparian/wetland areas. Treatments would be conducted in areas containing ponderosa pine, which likely would increase tree spacing, improve vegetation diversity, reduce fuel loads, and reduce the potential for larger crown fires and associated loss of ponderosa pine stands Prioritizing rehabilitation efforts and management adjustments in functioning at-risk and then non-functioning riparian areas would create a process to maintain or improve vegetation conditions in upland and riparian communities and forests and woodlands.

Prioritizing land treatments to reduce soil loss by watershed and reclaiming associated disturbances would further maintain or enhance vegetative conditions. Allowing vegetation treatments in fragile soil areas where such treatments would over the long term reduce erosion and restore watersheds, would maintain or improve vegetation conditions in fragile soil areas. In addition, these actions would help to reestablish seedlings and understory vegetation and retain soil moisture and nutrients.

Alternative C

Surface Uses and Disturbances

The magnitude of impacts from surface uses and disturbances associated with oil and gas, coal, minerals, and OHV recreation use would decrease compared to Alternative A. Surface uses and disturbances would more likely occur in areas with fewer restrictions. Alternative C would place more restrictions on surface uses and disturbances than Alternative A. Surface uses and disturbances would more likely occur in the following areas: areas open to oil and gas leasing subject to standard terms and conditions (393,800 acres less than for Alternative A), areas open for mineral material sales (379,000 acres, 68%), and areas open to locatable mineral entry (370,609 acres, 67%). No areas would be open to cross-country OHV recreation use and associated impacts would be eliminated. Impacts from the short- and long-term disturbance associated with oil and gas wells and coal development would be the same as for Alternative A.

Decreasing areas available for ROW development to 295,400 acres (53%) could decrease the extent of related vegetation removal associated with these activities. Under Alternative C, surface disturbance would not be allowed within 660 feet of riparian/wetland areas and in-kind offsite compensatory mitigation near the project site would be implemented on a site-specific basis for oil and gas authorizations and energy ROWs, which would minimize the potential for these impacts on riparian/wetland communities, providing more protection than under Alternative B, and ensure restoration within the same watershed.

The magnitude of impacts from recreational use could decrease because non-motorized recreation would be emphasized. Approximately 20,400 acres (4%) would be managed as motorized SRMAs and 108,600 acres (20%) would be managed as non-motorized SRMAs. Eliminating the OHV RMZ from the Kanab Community SRMA and the motorized RMZ from the Parunuweap SRMA would reduce the impacts on upland vegetation associated with OHV use in these areas.

Precluding commercial forest and woodland product harvest, including in WC areas, would eliminate associated removal of seedlings, understory vegetation, and mature trees. However, precluding harvests could also lead to higher fuel loads and pinyon-juniper encroachment. Implementing vegetation treatments would minimize the extent of these effects. Impacts from commercial woodland harvest would be the same as described in Alternative A, but could occur over a smaller area.

Limits or Restrictions on Surface Uses and Disturbances

The magnitude and intensity of these impacts from surface disturbing activities would decrease based on more restrictions and stipulations on surface disturbing activities. Further increasing stipulations on oil and gas exploration and development activities could reduce impacts on upland vegetation, riparian/wetland vegetation, and forests and woodlands. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (218,700 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (77,600 acres more than for Alternative A), and areas closed to oil and gas leasing (97,500 acres more than for Alternative A) (Map 2-31).

In addition to oil and gas leasing stipulations, locatable mineral withdrawals (158,800 acres) and mineral material closures (175,000 acres) would similarly help protect vegetation resources and reduce impacts on upland vegetation, riparian/wetland vegetation, and forests and woodlands. WC area, ACEC, WSR, and SRMA management actions would recommend areas for withdrawal from locatable mineral entry (158,800 acres, 29%) (Map 2-24). WC areas, WSA, ACEC, WSR, and SRMA management actions would close areas to mineral material sales (175,000 acres, 32%) (Map 2-35). In addition, areas managed as no surface disturbing actions (17,800 acres more than for Alternative A) and areas with seasonal limitations on surface disturbing actions (414,100 acres more than for Alternative A) (Map 2-45), ROW exclusion areas (255,200 acres, 46%) (Map 2-21), and areas closed to OHV recreation use (144,500 acres more than for Alternative A) would further restrict surface disturbing activities. These restrictions would help reduce associated impacts on upland vegetation, riparian/wetland communities, and forests and woodlands.

The magnitude of impacts from management of special status species would decrease compared to Alternative A because additional land use restrictions would further help to maintain or improve upland vegetation condition. Examples of the additional restrictions include: prohibiting surface disturbing and disruptive activities on identified crucial habitat, applying an NSO stipulation in habitat occupied by or suitable for federally listed and candidate plant species, prohibiting surface disturbing activities within ¼ mile of Western yellow-billed cuckoo and Southwestern willow flycatcher suitable habitat, and applying an NSO stipulation within 2 miles of Greater sage-grouse leks. These additional land use restrictions would further help to maintain or improve upland vegetation conditions, but could also increase constraints on options for vegetation treatments. These additional land use restrictions, particularly for riparian dependent species, would further help to maintain or improve vegetation conditions in riparian/wetland communities, but could also increase constraints on options for vegetation treatments.

The magnitude of impacts from management of soil resources would decrease compared to Alternative A. Surface disturbing activities would be precluded in fragile soil areas, which could further reduce soil erosion and maintain or improve upland vegetation conditions and adjacent riparian/wetland communities.

The magnitude of impacts from management of water resources could decrease compared to Alternative A. Not allowing new surface disturbing activities within 660 feet of riparian/wetland areas would protect more riparian/wetland vegetation because the area would be increased.

The magnitude of impacts from management of visual resources could decrease compared to Alternative A. VRM Class I areas would increase to 168,300 acres (30%) and VRM Class II areas would increase to 100,000 acres (18%). This would further reduce the extent of surface disturbance and thereby reduce possible related vegetation removal.

The Cottonwood Canyon (3,800 acres), Welsh's Milkweed (1,300 acres), White Cliffs (26,000 acres), Vermilion Cliffs (23,400 acres), and Parunuweap Canyon ACECs (6,100 acres) would all be managed as VRM Class II areas, as closed or recommended for withdrawal from mineral entry, and as closed or avoidance areas for new ROWs. This would greatly reduce the extent of surface disturbance and thereby reduce possible related vegetation removal, as compared to Alternative A. In addition, the Cottonwood Canyon, Welsh's Milkweed, White Cliffs, and Parunuweap Canyon ACECs would be either closed to mineral development or stipulated as NSO areas, which would further reduce the potential for surface disturbance in these areas.

Managing WSRs would have the same benefits as described in Alternative A, because all 15 eligible river segments (9,230 acres of river corridors, 2%) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification. Protection would no longer be on a case-by-case basis but would be designed to protect the ORVs, tentative classification, and free-flowing nature.

Vegetation Management and Habitat Manipulation

Impacts from implementing vegetation treatments on an annual average of at least 4,650 (93,000 acres over the life of the plan), not to exceed an annual average of 22,300 acres (446,000 over the life of the plan) would be the same as described in Alternative B. However, using treatment methods that mimic natural process would be preferred (e.g., prescribed fire, biological, and hand cutting) and likely would result in a slower process of vegetation enhancement. Although the same level of ecological condition could be reached over the long term, the rate of recovery likely would be reduced. Prioritizing treatments in areas not functioning properly would help maintain or improve the health of upland and riparian communities and forests and woodlands.

Alternative D

Surface Uses and Disturbances

The magnitude of impacts from surface uses and disturbances associated with oil and gas, coal, minerals, and OHV recreation use would decrease slightly compared to Alternative A. Surface uses and disturbances would more likely occur in areas with fewer restrictions. Alternative D would place slightly more restrictions on surface uses and disturbances than Alternative A. Surface uses and disturbances would more likely occur in the following areas: areas open to oil and gas leasing subject to standard terms and conditions (30,900 acres less than for Alternative A), areas open for mineral material sales (532,800 acres, 96%), areas open to locatable mineral entry (529,400 acres, 96%), and areas open to cross-country OHV recreation use (465,500 acres less than for alternative A). Impacts from the short- and long-term disturbance associated with oil and gas wells and coal development would be the same as described in Alternative A.

Compared to Alternative A, increasing areas available for ROW development to 463,600 acres (84%) could slightly decrease the extent of related vegetation removal associated with these activities. Under Alternative D, surface disturbance would not be allowed within 330 feet of riparian/wetland areas and in-kind or out-of-kind offsite compensatory mitigation would be implemented on a site-specific basis for oil and gas authorizations and energy ROWs, which would minimize the potential for these impacts on riparian/wetland communities.

Impacts from recreational use would increase compared to Alternative B. Approximately 96,600 acres (17%) would be managed as motorized SRMAs and 26,200 acres (5%) would be managed as non-motorized SRMAs. Not identifying the Orderville SRMA, North Fork Virgin River SRMA, and Escalante SRMA would remove the surface use restrictions associated with these areas, potentially allowing for oil

and gas development and concentrated recreational activities in these areas, which could increase the degree of surface disturbance and associated impacts.

The magnitude of impacts from commercial forest and woodland harvest could increase compared to Alternative A because commercial harvest could occur over a larger area.

Limits or Restrictions on Surface Uses and Disturbances

Alternative D would be less restrictive on oil and gas exploration and development activities than Alternatives B or Alternative C, but more restrictive than Alternative A. Stipulations on oil and gas exploration and development activities could reduce impacts on vegetation communities. Management actions for resources and resource uses that apply stipulations to surface disturbing activities include areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (13,400 acres more than for Alternative A), areas open to oil and gas leasing subject to major constraints (NSO) (17,500 acres more than for Alternative A), and areas closed to oil and gas leasing (75,100 acres, same as for Alternative A) (Map 2-32).

In addition to oil and gas leasing stipulations, stipulations on locatable mineral withdrawals (7 acres) and mineral material closures (21,200 acres) would similarly help protect soil resources and minimize erosion by restricting surface disturbances. Areas managed as no surface disturbing actions (4,800 acres more than for Alternative A), areas with seasonal limitations on surface disturbing actions (19,500 acres more than for Alternative A) (Map 2-46), ROW exclusion areas (75,200 acres or 14%) (Map 2-22), and areas closed to OHV recreation use (6,400 acres more than for Alternative A) would further restrict surface disturbing activities. These restrictions would help reduce associated impacts on upland vegetation, riparian/wetland communities, and forests and woodlands.

Impacts from management of special status species would decrease compared to Alternative B. An NSO stipulation would be applied within ¼ mile of Greater sage-grouse leks (instead of within ½ mile), which would minimally reduce the degree of effect described for Alternative B.

Impacts from management of soil resources would be the same as described in Alternative B.

Considering surface discharge of produced water on a case-by-case basis could increase the potential for increased discharge rates and salinity levels in receiving streams. This could result in reduced water quality and channel stability and thereby reduce the health of upland vegetation communities and adjacent riparian/wetland communities.

Compared to Alternative A, VRM Class I areas would increase to 75,400 acres (14%) and VRM Class II areas would increase to 59,900 acres (11%). This would further reduce the extent of surface disturbance and thereby reduce related vegetation removal and damage.

The reduction in surface disturbance that would maintain or improve vegetative resources would not occur as a result of ACEC or WSR management. Under this alternative, there would be no ACECs designated or eligible river segments determined suitable.

Vegetation Management and Habitat Manipulation

Impacts from implementing vegetation treatments on an annual average of at least 4,650 (93,000 acres over the life of the plan), not to exceed an annual average of 22,300 acres (446,000 over the life of the plan), would be the same as described in Alternative B.

Summary

Alternative A would have the most allocations for surface uses and disturbances with the least amount of areas with restrictions, which could adversely affect the ecological health of vegetation communities and increase the potential for the introduction and spread of noxious weeds. Alternative C would have the least allocations for surface uses and disturbances with the most restrictions, which likely would reduce the extent of associated impacts on vegetation communities. Although all alternatives provide measures to protect riparian areas, Alternative C would provide the largest area along riparian areas that restricts surface disturbance (660 feet), and implementing in-kind offsite compensatory mitigation near the project site would ensure restoration within the same watershed. Vegetation treatment management actions under Alternatives B and D would provide additional measures to manage and improve vegetation, which would generally maintain or improve the overall health of vegetation communities. Alternatives A and C would also provide vegetation treatments that maintain or improve the health of vegetation communities; however, Alternative C would involve use of treatments that mimic natural processes and the resulting enhancements to vegetation would take longer to realize. Under Alternative A, treatments would not occur in ponderosa pine forests, which would continue to lead to increased understory and fuel loads and possibly large crown fires and associated loss of ponderosa pine stands.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of vegetation resources under any of the alternatives. Long-term impacts on vegetation structure, composition, and health could be restored.

Short-term use of an area to accommodate energy and minerals, ROWs, and cross-country OHV use could result in long-term loss of vegetation diversity and increases in noxious and invasive species that could deteriorate the health of the vegetation community. The limited extent of foreseeable development, mitigating management actions, and application of BMPs would minimize the decreases in long-term productivity from short-term uses.

Surface disturbing activities could result in unavoidable adverse impacts, although these impacts could be mitigated to the extent possible. Permanent conversion of areas to other uses such as transportation and mineral and energy development would decrease vegetated areas. Applying BMPs, site-specific mitigation efforts, and restoration would decrease these impacts to the degree possible. Permanent mineral developments and their associated infrastructure would be mitigated to the extent possible to minimize loss of range resources.

4.2.5 Impacts on Special Status Species (Threatened, Endangered, and Sensitive)

This analysis focuses on impacts on special status species, including federally listed species, federal proposed and candidate species, BLM sensitive species, and Utah sensitive species as a result of management actions that affect species or their populations and changes to the condition of their habitats. Although some data on known locations and habitats within the decision area are available, the data are neither complete nor comprehensive on all special status species known to occur or on potential habitat that might exist. Known and potential special status species and habitat locations were considered in the analysis; however, the potential for species to occur outside these areas was also considered and, as a result, some impacts are discussed in more general terms. Impacts on other fish and wildlife species and their habitats are addressed in the Fish and Wildlife section.

Various laws, regulations, and policies require that special status species be fully analyzed in any BLM decision that could affect those species or their habitat. Analysis would include inventory, monitoring, evaluation, and identification of mitigation of effects. Mitigation actions would include project relocation or redesign (avoidance), monitoring, and site-specific mitigation.

Although information on locations of all special status species sites in the decision area is incomplete, the analysis considers the management alternatives and their potential to directly or indirectly affect special status species resources, as noted above. The number of species that could be affected by various actions is directly correlated with the degree, nature, and quantity of surface disturbing activities in the decision area. Impacts are quantified where possible. In the absence of quantitative data, best professional judgment was used. Some of the decisions in this document are programmatic; others may be implemented immediately (i.e., route designation, oil and gas leasing stipulations and conditions). To ensure preservation of specific species, further analyses will be required at the implementation level following site-specific species inventories.

Three general categories of impacts would be anticipated to be the most influential on special status species and their habitat—habitat alteration, fragmentation and/or loss, displacement, and habitat enhancement. Habitat alteration occurs when decisions change the existing habitat character. Surface disturbing activities, development, or other activities that degrade habitat could lead to habitat alteration, fragmentation, or loss. Habitat alteration, fragmentation, and loss may affect the usable ranges and routes for special status species wildlife movement. In addition, loss of habitat for pollinators of special status plants could result in the decline or loss of special status plant populations. Special status species wildlife displacement occurs when land use activities result in the movement of wildlife into other habitats, increasing stress on individual animals, and increasing competition for habitat resources. Impacts on special status species from displacement depend on the location, extent, timing, and/or the intensity of the disruptive activity or human presence. Occurrences of these disruptive activities in areas adjacent to special status species habitat cause displacement of special status species wildlife. Impacts from displacement could be greater for special status species wildlife with limited existing habitat and/or a low tolerance for disturbance. Habitat maintenance and enhancement can maintain or improve the condition of vegetation and levels of forage species and maintain existing erosion rates or reduce soil loss through vegetation treatments and restrictions on surface disturbing activities.

The following assumptions were used in the analysis:

- Local populations are naturally affected by non-human–caused factors such as climate, natural predation, disease outbreaks, natural fire regimes, and competition for available habitat from other native species.

- Ground disturbing activities could lead to modification (positive or negative), loss (short-term or long-term), or fragmentation of special status species habitat and/or loss or gain of individuals, depending on the amount of area disturbed, the species affected, and the location of the disturbance.
- Changes in air, water, and habitat quality could lead to direct impacts, and could have cumulative impacts on species survival.
- Impacts on special status species could be more significant than impacts on non–special status species.
- The U.S. Fish and Wildlife Service (USFWS) would be consulted on any action that could potentially affect any listed plant or animal species or their habitat.

In accordance with Section 7(a) 2 of the Endangered Species Act of 1973 (ESA), as amended, the BLM KFO initiated Section 7 consultation with the USFWS. This process involves preparing a biological assessment (BA) that includes impact analyses and subsequent determinations for all federally listed and proposed species. The BA considers potential project-related effects (direct and indirect) to each species and their habitat from the management actions presented in the Preferred Alternative (Alternative B). Additional consultation with the USFWS would still be required for all implementation-level activities if they would be implemented within suitable or potentially suitable habitat for federally listed species.

Under all alternatives, impacts on special status species are not anticipated as a result of implementing management actions for the following resources and designations: air quality and other designations.

Impacts Common to All Alternatives

Habitat Alteration, Fragmentation, and/or Loss

Some of the goals and wildland fire ecology decisions provide for the restoration of historical habitats and native plant species and to enhance, maintain, and protect ecological resources. Short-term loss of habitat would be offset by long-term effects of rehabilitation activities, protection of ecological resources (from effective fire suppression), and reduction of fuels (following prescribed fire, non-fire fuel treatment, or implementation of wildland fire use). The subsequent, gradual return to a more natural fire regime would result in long-term habitat enhancement.

Effects of fire on special status species and their habitat vary widely depending on the vegetation type with which the species is associated and the size and intensity of the fire, fuel type, location, topography, season, and duration. For example, special status species habitat associated with aspen is less likely to be destroyed or severely altered by wildland fires than special status species associated with sagebrush, because aspen stands do not easily burn and often act as natural fuel breaks during wildland fires. Most sagebrush species do not sprout after fire and most plants are killed by low- to high-intensity fires. The result of wildfire in special status species habitat associated with native grasslands would be similar to result in sagebrush because native grasslands are usually seral to sagebrush, and so have a similar fire regime. Wildfire in most mountain shrub communities would be similar to aspen stands because most species of mountain shrubs resprout following low- to moderate-severity fire. Sprouting mountain shrub communities generally recover following wildland fire and are considered fire-tolerant. High-severity fire can destroy large areas of habitat and make the recovery of those habitats a long-term process. Both low- and high-severity wildland fires can destroy important habitat, displace animal species, and inflict direct mortality. However, low-severity fires have the potential to enhance and sustain a more natural and beneficial habitat. Wildland fire suppression activities have the highest potential for effects on special status species because resource protection measures would not necessarily be fully implemented due to risks to firefighters or public safety, and also because emergency fire suppression action sometimes requires a quick response without detailed, site-specific data or analysis. Examples of impacts from wildfires include: heat stress or mortality to special status plants from wildland fire operations; damage to

the seedbank of special status plants from severe fire or mechanical disruption during fire suppression operations; and removal of key habitat components for nesting, denning, foraging, roosting, or cover due to equipment use or operational tactics. Prescribed fire could have similar effects; however, due to site-specific project plans for prescribed fire, the BLM would minimize or avoid these effects. With suppression being implemented where unplanned wildfire is not desirable, and wildland fire use, prescribed fire, and non-fire fuel treatments being used to minimize fuel loading, vegetation communities and wildlife habitats would transition over time to more closely reflect conditions associated with a habitat's natural fire regime. This would create a more balanced (diverse) and stable ecosystem that would have a reduced threat of severe wildland fire.

In general, ROW development (including powerlines, pipelines, wind and solar projects, and communication sites) would disturb habitats that could be occupied by special status species where ROW developments are authorized. Most ROWs would be located in common (within existing or shared ROWs), which would result in concentrated surface disturbances and habitat deterioration or loss. Special status plants would be most affected by ROW development due to their inability to seek alternative habitats, whereas the majority of special status wildlife could seek alternative habitats. ROWs located in common could also reduce the degree of habitat fragmentation within the decision area if properly located outside of or on the fringe of special status species habitat. Locating ROWs in common could actually increase habitat loss or fragmentation if improperly located through habitat.

Authorized excavation of cultural sites and paleontological localities could result in localized loss of special status species habitat. The short- and long-term impacts associated with these actions would not be detrimental to the species and their associated habitat given the limited footprint of such actions on the landscape.

Displacement

Recreation activity likely would have an effect on special status species and their habitats. Motorized use would have greater effects than non-motorized use. Users could introduce noise that could disturb species during sensitive periods, which could indirectly affect reproduction or cause species to abandon areas, such as nest sites or areas containing key habitat components containing important food sources. Effects likely would be greater in areas that receive frequent and/or intense recreation use; however, the number of areas of frequent and/or intense recreation use is small. Areas that would be subject to more visitation would include easily accessible locations, such as along major roads, near communities, or in areas that offer attractive opportunities for recreation. Although damage to special status species habitats would continue to be monitored, impacts from dispersed use would not be apparent until after the damage has occurred, which would then be appropriately mitigated to the extent practical and feasible.

Permitted activities (including mineral exploration and development, ROW and facility construction, and other activities subject to site-specific NEPA evaluation and monitoring) could result in displacement of special status species from noise and human presence associated with these activities. Construction and maintenance noise associated with mining, vehicular traffic, and other human activities could cause disturbances to species during sensitive periods, which could potentially cause special status species to abandon roosts or nest sites. BLM management of areas allowable for permitted activity and protection of special status species habitats could reduce any potential for cumulative habitat degradation, such as NSO and seasonal closures. NSO buffers for special status species and their habitats would afford direct protection to those species and refuge for special status species sensitive to activity that could occur within these areas. Seasonal closures of special status species habitats would provide direct protection from disruptive activity during sensitive periods. Under all alternatives, special status species habitat within the Alton coal field could be lost short and long term due to surface coal mining activities on and adjacent to these areas. Specifically, this would affect the southern-most population of the Greater sage-grouse. Although the federally administered coal resources do not coincide with the lek used by the local

population, the development of the coal mine would eliminate habitat resources on brood-rearing habitat and habitat adjacent to the lek. Development of the coal mine, removal of the overburden, and surface mining operations would result in the long-term (life of the RMP) loss of habitat resources and displacement of individual birds. Although mitigation and reclamation could reduce the impacts, development of the coal mine could result in displacement or loss of the local population.

Habitat Maintenance and/or Enhancement

Implementing decisions to increase populations of special status species, developing and implementing monitoring and conservation measures for listed and sensitive species and their habitats, and working with the Utah Division of Wildlife Resources (UDWR) and other partners to implement the Utah Comprehensive Wildlife Conservation Strategy (UDWR 2005a) for preventing the need for further listing of species would protect and foster recovery of special status species and maintain habitat conditions. Impacts on special status species from applying *Standards for Rangeland Health* to all rangelands and *Guidelines for Grazing Management for BLM Lands in Utah* (BLM 1997a) for rehabilitation of rangelands would offer protection for special status species and assist in maintaining or improving the ecological health and condition of rangeland ecosystems over the long term, which could provide necessary habitat components for special status species.

In general, management actions for bald eagles and Utah prairie dog that are common to all alternatives would provide direct protection to these species and associated habitats and avoid and reduce habitat deterioration in areas occupied by special status species. In addition, management actions that are common to all alternatives for the Mexican spotted owl, such as permitting no surface activities or occupancy within ½ mile of Mexican spotted owl nests and no surface disturbing activities from March 1 to August 31 in protected activity centers (PACs), breeding habitats, or designated critical habitat, would provide direct protection and minimize disturbance to Mexican spotted owl nesting and fledgling habitat, and minimize disturbance or harassment to Mexican spotted owl during the breeding season. These decisions would also provide habitat protection for other special status species that may also be sensitive to disruptive activities in these areas. Surveying would aid in identifying locations and distribution of Mexican spotted owl and other special status species and in protecting occurrences that are identified.

Management actions that are common to all alternatives for the Western yellow-billed cuckoo and Southwestern willow flycatcher, such as monitoring and restricting authorized or casual use activities that may adversely impact Southwestern willow flycatchers or their habitats, would provide direct protection and minimize disturbance in Western yellow-billed cuckoo and Southwestern willow flycatcher habitats. These decisions would also provide habitat protection for other special status species that may also be sensitive to disruptive activities. Surveying would aid in identifying locations and distribution of Western yellow-billed cuckoos and Southwestern willow flycatchers and other special status species and in protecting occurrences that are identified. Management actions associated with water quality and watershed health such as BMPs, protection of culinary water supplies, and water source protection zones could maintain or improve the conditions of riparian areas and water sources that may be occupied by special status species. Management of riparian areas through project design features or stipulations and water retention would maintain or improve special status species habitat conditions and retain adequate water supply for special status species.

Implementation of the Welsh's milkweed and Siler's pincushion cactus recovery plans would provide overall protection to maintain or improve habitat conditions for these species. In addition, prohibiting motorized use in and through islands of vegetation in designated critical habitat for Welsh's milkweed (790 acres) would eliminate further potential disturbance to this species from these activities.

Continuing to implement noxious weed and invasive species control measures could help maintain or improve special status species habitat conditions, but could cause localized temporary disturbances during control measures.

In general, management actions for fish and wildlife habitat, which include use of BMPs, coordination with other agencies, and inventories, would indirectly protect and promote habitats used by special status species.

Management in WSAs consistent with BLM interim management policy would indirectly protect and enhance special status species habitat characteristics.

Alternative A

Habitat Alteration, Fragmentation, and/or Loss

Recreation and OHV activity likely would have the greatest effect on special status species and their habitats. Unlike permitted activities (e.g., mineral exploration and development, ROWs, SRPs, and forestry and woodland harvest) that are subject to site-specific environmental review and monitoring, recreation and OHV activity would have limited management or restrictions, which could result in effects to special status species as dispersed use increases over time. More acres would remain open to cross-country OHV use than in any of the other alternatives. As a result, the potential for adverse impact occurring, such as habitat fragmentation, loss, or alteration, would be greater. Dispersed recreation users could inadvertently trample special status plant species or damage special status species habitats while camping, hiking, or exploring. Humans, pets, and vehicles could also act as dispersal agents for invasive weeds, which degrade special status species habitat. Although damage to special status species habitats would continue to be monitored, impacts from dispersed use would not be apparent until after the damage has occurred, which would then be appropriately mitigated to the extent practical and feasible.

Constructing new trails and recreation facilities, which would be subject to site-specific environmental NEPA review, could introduce new areas of surface disturbance and concentrate human presence, depending on the location of the trails/facilities, in sensitive special status species habitat. This could decrease special status species populations or cause special status species displacement and provide avenues for the spread of noxious weeds, which could result in modification of a special status species forage base.

Due to increasing recreational OHV use, allowing cross-country OHV use to continue to occur over 84 percent of the decision area (466,600 acres), particularly in the Coral Pink Sand Dunes area, could affect special status species and necessary habitat components. Depending on the extent and timing of OHV use, the resulting degradation to vegetation communities could cause slight to significant changes to habitats that could be occupied by special status species or provide those necessary habitat components. OHV use has the potential to cause direct mortality of special status species through accidental kills by vehicles, stress-related mortality caused by human and OHV presence, or incidental harassment (Havlick 2002), and modification of habitat as a result of loss of vegetation, soil compaction, and introduction of weed species (Hall 1980, Webb 1983). In the case of the Coral Pink Sand Dunes tiger beetle, Knisley and Gowan (2005) determined that a decline in population numbers was likely a result of ensuing drought in the area and that the presence of the protected area did not prevent wide swings in beetle abundance. They did determine, however, that the protected area may play a critical role during years of low abundance because when populations are low, beetles concentrate in the protected areas, and having a refuge from OHV activity is critical given the small population. Areas that would be subject to more visitation would include easily accessible locations, such as along major roads, near communities, or in areas that offer attractive opportunities for recreation. In the case of Welsh's milkweed, because the milkweed is a

pioneer species and prefers unvegetated dune sites, as communities expand from vegetated areas into unvegetated dunes, individual plants could be affected by uses in these areas.

Cross-country OHV use could also result in the incidental loss of special status species, of which plants would be most susceptible because they are stationary and have specialized habitat needs, including unique soil substrates. The possible long-term habitat deterioration could eliminate potential habitat, which could otherwise foster expansion of special status species from current territories. The future increase of human activity in areas that could be occupied by special status species would also introduce additional disturbance during sensitive periods.

Seasonally limiting OHV use to existing or designated routes on crucial Greater sage-grouse strutting grounds and on nesting and roosting sites for bald and golden eagles would provide protection to these species during sensitive life stages; however, it would not provide overall protection to their habitat because these areas are open to cross-country OHV use outside of designated time frames. Seasonally limiting OHV use in the area on the north side of Pugh Canyon for breeding raptors would provide protection for these species during sensitive life stages. Limiting OHV use on 66,200 acres to 57 miles of designated routes," including areas identified as highly erodible, frail soils, and critical Utah prairie dog habitat, would minimize surface disturbances to special status species and their habitats in these areas from OHV use. Prohibiting motorized use in and through islands of vegetation in designated critical habitat for Welsh's milkweed (790 acres) would provide immediate protection for the species; however, indirect effects of the shifting nature of the dunes could result in difficulty monitoring and OHV user self-policing, which could result in take of some plants. Esplin (2005 and 2006) determined that Welsh's milkweed moves with the dunes and is, therefore, more susceptible to stem damage from OHV use (plants were shown to survive with damage); however, no reliable correlation could be made in his research between OHV use and decreasing stem counts. Esplin (2005 and 2006) concluded that Welsh's milkweed thrives and competes best in actively moving dunes and that the most likely factor affecting survival of the plant is competition from other vegetation. Closing an overall 21,200 acres to OHV use would ensure protection of special status species and associated habitat from OHV impacts.

Permitted surface disturbing activities cause habitat alteration, fragmentation, and/or loss depending on the type, amount, and location of activity. Habitat fragmentation occurs when a contiguous habitat is broken up (fragmented) by surface disturbing activities, causing a reduction in usable ranges; disruption of movements among habitats, transitional areas, and breeding areas; isolation of smaller, less mobile species; and increase in habitat generalists that are characteristic of disturbed environments (Harris 1991). Allowing oil and gas leasing subject to the standard terms and conditions on 422,200 acres (76%) could result in fragmentation through reduction of usable habitat and disruption of movements among habitats, transitional areas, and breeding areas associated with the construction of access roads, facilities, and wells. Oil and gas exploration and development activities would disturb approximately 2,976 acres over 20 years. Approximately 2,370 acres would be reclaimed within 20 years. Authorized wells would not be anticipated to adversely affect species populations; however, population function could decline and become significant as development increases. Species that have expansive habitat requirements in areas that do not restrict mineral activity, such as the BLM Sensitive Greater sage-grouse and other sagebrush-obligate species could be indirectly affected by loss of important habitat components resulting from introduction of noxious and invasive weeds, and conversion of large areas to early seral vegetation as well pads are reclaimed. Disturbance to habitats could displace special status species and the possible long-term habitat deterioration could eliminate potential habitat that might otherwise foster expansion of special status species from current territories. On the contrary, conversion of large expanses to early seral vegetation could provide additional habitat that fosters some special status species, such as the Utah prairie dog. Big game winter range oil and gas development timing limitation stipulations would indirectly provide temporary refuge for special status species sensitive to activity that may occur in conjunction with these areas; however, it would not provide long-term protection of habitat.

In general, areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (51,200 acres) would enable the BLM to provide some protection of special status species habitat by controlling where development activities occur; however, overall reduction in usable habitat and disruption of movements among habitats associated with the construction of access roads, facilities, and wells could still occur in these areas. Areas open to oil and gas leasing subject to major constraints (NSO) (5,500 acres) would protect and enhance special status species habitat characteristics from oil and gas development activities. Closing areas (75,100 acres) to oil and gas leasing consistent with BLM interim management policy would protect and enhance special status species habitat characteristics from oil and gas development activities.

Forest and woodland harvest, road construction, facility construction, other mineral development and construction of associated facilities, and ROW construction could result in the loss of special status species habitat. Special status species habitat losses include potential habitat for special status species plants; cover for small mammals and reptiles; winter concentration, nesting, and foraging habitat for birds; and roost and foraging areas for bats. In addition, the loss of habitat for pollinators of special status plants could result in the decline or loss of special status plant populations. Seclusion areas for special status wildlife species would become smaller, more fragmented, and dispersed in these areas, which could lead to a decrease in special status species wildlife populations as a result of habitat loss. Surface disturbing activities could increase sediment delivery to streams, which could interfere with the life history requisites of special status fish. Excluding outstanding natural areas and areas of recent surface reclamation from wood product disposal, prohibiting cutting of standing ponderosa pine, and maintaining live or dead standing trees would reduce the effect of commercial forest and woodland product harvest on special status species habitat and provide direct protection to some species of special status raptors. These measures would also reduce or eliminate displacement of raptors from nesting areas.

Special status species habitat contained within the 3,600-acre potential mining area within the Alton coal field could be lost over the long term due to surface coal mining activities on and adjacent to these areas. Reclamation activities would be implemented beginning within 3 years of initial disturbance at an average rate of 100 acres per year. Site-specific NEPA analysis is required prior to approval of the coal lease.

Management of locatable minerals and mineral materials would result in short-term localized and indirect impacts on special status species and associated habitat through surface disturbance and habitat loss. Impacts would be minimal for locatable mineral development because a plan of operation, including a reclamation plan, is required prior to development of locatable minerals. Surface disturbance from development of locatable minerals and mineral materials would be approximately 1,050 acres over 20 years; site-specific impacts would be addressed prior to development. The development of locatable minerals and mineral materials could cause localized impacts on special status species through the disturbance of habitat.

Management of Greater sage-grouse habitat under Alternative A would result in minimal protection of strutting grounds (leks) through seasonal limitations on OHV use and oil and gas development. These restrictions would reduce impacts on these species during strutting; however, they would not provide protection during nesting or brood-rearing activities, which could lead to habitat alteration or loss. This could result in the displacement or use of these sub-optimal habitats, leading to declining population trends or the loss of some populations within the decision area or within lands adjacent to the decision area. Not requiring road crossings to support fish passage could eliminate the possibility of areas being recolonized from a neighboring population and prevent natural movement of fish populations in fisheries.

Salvage of wood products from established harvest areas and allowing harvesting of dead and down tree could reduce a source of cover for special status species who depend on dead trees for a portion of their habitat requirements. Also, permitting harvesting of juniper posts and pinyon pine could reduce existing

or potential nesting sites for bird and potential cover for bird, small mammal, and reptile special status species.

Not requiring road crossings to support fish passage could eliminate the possibility of areas being recolonized from a neighboring population and prevent natural movement of fish populations in fisheries. This could provide separation of native fish species from more aggressive introduced species, which would provide protection for special status fish species.

Displacement

Displacement from activities such as cross-country OHV use, motorized recreation, dispersed recreation, and/or surface disturbance activities may move animals into less desirable habitat and increase competition for available resources with other species and uses. Users could introduce noise or dust that could disturb species during sensitive periods, which could indirectly affect reproduction or cause species to abandon areas such as nest sites or areas containing key habitat components containing important food sources. Stress inflicted on species could also deteriorate species health, which could affect survivability. Displaced wildlife incurs a physiological cost through excitement (preparation for exertion) and/or through locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to lower quality habitat. Chronic or continuous disturbance could result in reduced animal fitness and reproductive potential, and abandonment of young (mortality) (Geist 1978). OHV use would be limited to 57 miles of existing or designated routes on approximately 66,200 acres (12%), which would reduce or eliminate the surface disturbance impacts discussed above, but would not result in a large reduction of displacement of special status species from human presence and noise.

Vegetation treatments would result in temporary displacement of special status species wildlife during treatment. However, over the long term, the treated areas would provide improved forage conditions and reduced erosion, which would enhance special status species wildlife habitat and fisheries.

Habitat Maintenance and/or Enhancement

Changes to habitat conditions would occur as a result of vegetation treatments to reduce soil loss, improve crucial big game habitat, restore ecological function, and increase forage production. In general, this would improve habitat conditions or provide missing habitat components, reduce sedimentation in water sources occupied by special status species, and improve wildlife habitat for special status species with similar forage requirements. These treatments could provide diverse habitats for various special status species. Vegetation restoration would maintain or improve special status species associated habitats; however, there would be short-term impacts on habitat and displacement of special status species wildlife until vegetation communities reestablished themselves. Prescribed fires would improve the diversity of vegetation age classes, and 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 that require expansive tracts of contiguous late-successional habitat. Vegetation treatments in upland areas could, under limited conditions, increase water yields and affect fish habitats. These effects are likely to be highly variable depending on local hydrologic characteristics and fish community interactions. Vegetation treatments in upland areas often divert livestock and wildlife use away from riparian/wetland areas, increasing the vigor and structural diversity of these plant communities. This would lead to increased growth of woody and herbaceous riparian vegetation that, in turn, would increase channel stability and stream shading, which would improve habitat conditions for fishes.

Maintaining standing ponderosa pine, in addition to protecting bald eagle feeding and concentration areas, peregrine falcon use areas, and other raptor nest sites would provide direct protection to special status raptors and avoid and reduce habitat deterioration in areas occupied by special status species. These

measures would also reduce or eliminate displacement of raptors from feeding and nesting areas, reducing or eliminating possible effects of increased stress and abandonment of the habitat.

Under Alternative A, livestock grazing could be restricted in identified areas to improve riparian/fisheries habitat. This could provide protection to riparian-dependent and in-stream special status species. Implementing measures for protection and minimizing disturbance in fragile soils areas could protect special status species and their habitat from temporary disturbances or minimize disturbances to special status species and associated habitats from uses in these areas.

Implementing measures for protection and minimizing disturbance in and adjacent to riparian areas would minimize changes in stream characteristics, which could result in altered water chemistry (e.g., phosphorous loading), increased sediment loads, or elevated mineral concentrations (e.g., selenium). Reducing sediment loading in the decision area would protect important habitat characteristics of special status species fish in the decision area, and downstream in both the Virgin and Colorado River drainages.

In general, areas with VRM Class I and II objectives would indirectly provide long-term preservation of special status species habitat characteristics through a low level of change to the characteristic landscape. Approximately 21,200 acres would be classified as Class I and 99,900 acres would be classified as Class II under Alternative A.

Closing wetland/riparian spring exclosures, sensitive plant exclosures, and some wildlife management areas to grazing would ensure protection of sensitive plants in exclosures and improve special status species habitat by increasing vegetation diversity. This could improve riparian/wetland functioning condition by reducing erosion and improve special status species fisheries habitat by decreasing siltation and improving spawning habitat. Not allowing surface disturbance from oil and gas or other activities on occupied Utah prairie dog habitat would provide direct protection and minimize disturbance from oil and gas activity to Utah prairie dog habitat and other special status species sensitive to activity that may occur in conjunction with these areas.

Special designations (e.g., WSAs and ACECs) management could reduce or eliminate surface disturbance, thereby protecting special status species habitats. Protections aimed at conserving vegetation and at limitations on surface disturbing and other disruptive activities would maintain overall habitat conditions. Management of the Water Canyon/South Fork Indian Canyon ACEC would indirectly protect special status species habitat characteristics from surface disturbances through stipulations on oil and gas leasing (NSO), closures to locatable minerals, and limiting OHV use to existing routes. Managing eligible WSR segments to protect ORVs, free-flowing nature, and tentative classification would protect associated special status species habitat values in these areas.

Implementing special status species plant recovery plans would provide protection and habitat enhancement for special status species plants and other special status species occurring in these areas. Water developments for specific species in areas with limited water sources for mule deer distribution and designing livestock water developments near proposed wildlife water developments to serve both wildlife and livestock purposes would provide additional habitat components for special status species use, but could cause temporary disturbances during project construction.

Alternative B

Habitat Alteration, Fragmentation, and/or Loss

Managing OHV use throughout the majority of the decision area (524,000 acres, 95%) as limited to 1,387 miles of designated routes would minimize surface disturbances to special status species and their habitats, greatly reducing surface disturbance of special status species habitat as compared to Alternative

A. The 1,100 acres open to cross-country OHV use would occur within areas that have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes) or human use (e.g., topsoil pit). Continued disturbance in the topsoil pit would not result in any additional loss of habitat values causing little to no effects on special status species and associated habitat. In the case of Welsh's milkweed, because the milkweed is a pioneer species and prefers unvegetated dune sites, as communities expand from vegetated areas into unvegetated dunes, individual plants could be affected by uses in these areas.

Precluding cross-country OHV use in Greater sage-grouse brooding habitat would prevent habitat alteration or loss from OHV activity compared to Alternative A. Seasonally limiting OHV use within nesting and roosting sites for special status species raptors would provide protection to these species during sensitive life stages and protection of habitat would occur outside of the seasonal limits due to OHV being limited to designated routes. Management of OHV use in designated critical habitat for Welsh's milkweed would be the same as described in Alternative A. Closing an overall 28,900 acres and 118 miles of routes to OHV use would ensure greater protection of special status species and associated habitat from OHV impacts than Alternative A.

Precluding cross-country OHV use and avoiding ROWs with high-profile structures within 1 mile of active leks or brood-rearing habitat would offer greater protection to sage-grouse habitats as compared to Alternative A. Managing oil and gas leasing as open to leasing subject to major constraints (NSO) within ½ mile of leks would provide direct protection to leks from surface disturbance associated with oil and gas development, and allowing no surface disturbing or otherwise disruptive activities within 2 miles of active Greater sage-grouse leks during strutting and brood-rearing seasons would minimize or eliminate disturbance during sensitive periods. Avoiding insecticide use during the early development stages of sage-grouse chicks would increase their survivability.

The type of impacts from oil and gas leasing would be the same as described in Alternative A, except that 263,400 acres (158,800 acres less, or 38% less, compared to Alternative A) would be open to oil and gas leasing subject to the standard terms and conditions. Although the acres disturbed by oil and gas development would remain the same (Appendix I), stipulations on disturbance in special status species habitat would decrease the potential for the impacts from surface disturbance associated with oil and gas exploration and development.

Impacts from habitat loss caused by forest and woodland product harvest, road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would be similar to Alternative A, except that forest and woodland product harvest would be allowed in the entire decision area on a case-by-case basis. The current and anticipated demand for forest and woodland products would not result in an increase of impacts compared to Alternative A.

Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as described in Alternative A.

Designing road crossings to support fish passage in areas that support fish would allow for areas to be recolonized from a neighboring population and allow natural movement of fish populations in fisheries. This could also allow for movement of more aggressive introduced species into special status fish species habitat.

Displacement

Allowing cross-country OHV use (more than 1,100 acres) on 1,385 miles of designated routes in areas where OHV use is limited to designated routes (524,000 acres, 95%) would result in the displacement of special status species through the human presence, noise, and disruptive activities; however, effects would

be considerably less than for Alternative A. Areas closed to OHV use (28,900 acres, 5%) or areas away from designated routes where OHV use is limited to designated routes would avoid impacts associated with disruption and preserve habitat characteristics.

Displacement of special status wildlife species during vegetation treatments would be the same as described in Alternative A, except more acres could be treated. This could result in an increase in short-term displacement immediately following the treatments; however, in the long term, vegetation treatments for special status species would improve habitat characteristics.

Impacts from dispersed recreation activity, mineral exploration and development, and ROW development would be the same as described in Alternative A, except as described below. The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could displace wildlife species from habitat surrounding interpretive sites and result in trampling, collection, and other inadvertent removal of plant species, depending on the location and level of human presence associated with the site. Mitigation (e.g., timing, location, and group size limits) would be identified during site-specific NEPA analysis, thus reducing the potential for impacts. Increasing management presence in SRMAs (125,800 acres, 23%) would decrease impacts from dispersed recreation activities identified under Alternative A. Implementation plans for each SRMA could include mitigations to avoid special status plant species and minimize trampling of plant species. Management of recreation by allowing dispersed camping could result in trampling and removal of special status plant species and likely would result in minor localized harassment of special status species wildlife due to human presence and disruptive activities.

Closing raptor areas (including those associated with special status species) to rock climbing could result in the elimination of long-term disruptive effects on nesting activities during sensitive periods, which could indirectly affect reproduction and cause species to not abandon areas. Limiting SRP groups to 12 people per group within wetland or riparian zones, WSAs, and designated critical habitat for special status species, and limiting SRP groups to 25 people per group in the remainder of the decision area could reduce the effects of displacement from large groups of people.

Habitat Maintenance and/or Enhancement

Focusing vegetation treatments on identified high-priority areas and increasing the potential treatment acres would target areas where habitat function could be most improved; site-specific impacts would be addressed prior to treatment. In addition, treatments associated with maintaining or restoring special status species habitat, including Greater-sage-grouse, would improve overall habitat conditions for these species. This would result in an increase in habitat components, including increased forage and shelter. Vegetation treatments on an average of no more than 22,300 acres annually could maintain natural disturbance rates.

General vegetation management of rehabilitation objectives, including managing for 51 percent or higher of PNC, would maintain available forage and maintain or enhance special status species habitat. Vegetation management in riparian areas would maintain or improve special status species habitat conditions, provide direct protection of special status species habitat, and retain adequate water supply to support fisheries. Protecting hanging gardens could have similar results in these areas. Restoring sagebrush steppe communities and old-growth forest and woodland stands would improve the long-term ecological health and habitat condition. Treatments for sagebrush steppe restoration could cause temporary disturbances to special status species occupying these areas.

Management of noxious and invasive species would improve the ecological health and condition in treated areas over time, which may provide necessary habitat components for special status species, but could cause temporary disturbances to special status species occupying treated areas. Closing and

reclaiming roads, facilities, or improvements that are no longer necessary could deter continued use of the area, resulting in reduced disturbance to special status species habitat. Reclaiming roads would enhance special status species wildlife habitat through removal of disturbed areas, increase in forage, and reduction of habitat fragmentation. In addition, noise and disturbance associated with roads would be eliminated by reclaiming roads.

The effects of maintaining ponderosa pine stands would be similar to those described under Alternative A; however, focus would be on maintaining overall stand health, not just on protecting trees, which may result in temporary disturbance from treatments to restore stand health. Using *Best Management Practices for Raptors and Their Associated Habitats* (BLM 2006a) would provide for use of seasonal and spatial buffers, as well as mitigation, to maintain and enhance special status species raptor nesting and foraging habitat.

Alternative B would be more restrictive to surface disturbing activities than Alternative A. Areas that are closed to surface disturbing activities (19,700 acres, 4%), open to oil and gas leasing subject to major constraints (NSO), and closed to oil and gas leasing (133,900 acres, 24%), areas withdrawn and recommended for withdrawal from minerals entry (24,600 acres, 4%, and 9,500 acres, 2%, respectively), areas closed to mineral material disposals (78,500 acres, 14%), ROW exclusion areas (75,700 acres, 14%), ROW avoidance areas (78,900 acres, 14%), and areas closed to OHV use (28,900 acres, 5%) would protect special status species habitat from such activities. These decisions include restrictions on uses of fish and wildlife habitat, special status species habitat, ACECs, SRMAs, WSAs, WSRs, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain special status species habitat quality, and reduce or eliminate the effects of displacement from human presence. Protection of fragile soil areas and implementation of erosion control measures would reduce erosion and surface runoff, which could enhance special status species habitat. Applying BMPs to avoid or reduce fragmenting habitat and mitigating habitat losses for listed and sensitive species at a minimum ratio of 1:1, and at a 2:1 ratio for riparian areas, could avoid and reduce habitat fragmentation and losses for special status species. In addition, in-kind mitigation would be considered in proximity to impacted riparian habitats, which could reduce habitat fragmentation and losses for special status species.

Incorporating erosion control measures on slopes greater than 15 percent would further reduce erosion and surface runoff, which could enhance special status species habitat. In addition, cooperative implementation of the *Upper Sevier Watershed Management Plan*, managing the Sevier River in accordance with the total maximum daily load (TMDL), and avoiding or minimizing impacts on water quality could maintain or improve the conditions of fisheries. Managing the discharge of produced waters, including no surface discharge in the Colorado River Basin, would maintain special status species habitat by preventing possible degradation of water quality and fisheries.

Management of the plague and other diseases in Utah prairie dog colonies could reduce the spread of plague in this species and others. Protective management measures for the Mexican spotted owl, including prohibiting new recreation facilities or trails within PACs, seasonal closures of existing facilities, and limiting SRP groups to 12 persons per group or less would protect and enhance this species habitat and reduce human presence and disruptive activities.

Permitting commercial timber harvest for the purpose of promoting forest health would improve the long-term health of forest habitats. However, this could cause temporary disturbances or displacement during project implementation. Site-specific impacts would be addressed prior to harvest. Management actions for woodland product harvest, such as closing WSAs to harvest except for incidental collection for onsite campfire use and administrative purposes, would provide a source of cover and habitat for prey species and ensure a prey base for raptors and other predators. Permitting woodland product harvesting in riparian

areas in proper functioning condition on a case-by-case basis for maintenance and/or improvement of riparian ecosystems could provide long-term habitat enhancement through overall forest health and habitat diversity.

Management of ROWs and ROW corridors for the siting and construction of communication towers using measures to avoid and minimize impacts on migratory birds likely would minimize or eliminate loss of migratory birds from guy wires and other associated features of communication towers, enhancing overall habitat for migratory birds. Managing powerlines to reduce the risk of raptor electrocution or line-strike would reduce raptor injury and mortality. In addition, burying new and reconstructed utility lines could further reduce electrocution risks to raptors and collision potential for migratory birds.

The effects of not allowing surface disturbing activities within a certain distance from riparian/wetland areas on special status species and associated habitat characteristics would be similar to Alternative A, except that no surface disturbing activities would be allowed within 330 feet of riparian/wetland areas rather than within 400 feet as in Alternative A. Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 48,500 more acres than Alternative A, which would provide more protection to special status species and associated habitat from development activities within these areas.

Closing wetland/riparian spring exclosures, sensitive plant exclosures, and some wildlife management areas to grazing would not occur under Alternative B, which could result in potential erosion and siltation within wetland/riparian areas that receive concentrated livestock use. This could result in the potential for site-specific temporary modification of the areas' ecological condition, reducing habitat values for sensitive plants and animals due to concentrated livestock use. Applying the Standards and Guidelines would eliminate these impacts and maintain or restore habitat values.

Special designations (e.g., ACECs, WSAs, and WSRs) management could reduce or eliminate surface disturbance, thereby protecting special status species habitats. Management aimed at conserving vegetation and limitations on surface disturbing and other disruptive activities would maintain overall habitat conditions. Management of the Cottonwood Canyon ACEC would indirectly provide greater protection to special status species habitat characteristics than Alternative A from surface disturbances through stipulations on oil and gas leasing subject to major constraints (NSO), closures to mineral entry and disposal, and limiting OHV use to designated routes. Managing suitable river segments to protect their ORVs, free-flowing nature, and tentative classification would provide direct protection to wildlife ORVs within 4,550 acres of river corridors (23.7 miles) (1,050 acres less, 19% less, than Alternative A).

Alternative C

Habitat Alteration, Fragmentation and/or Loss

There would be no habitat loss caused by areas open to cross-country OHV use because such use would be precluded. Alternative C would provide the greatest protection to Greater sage-grouse habitat by precluding cross-country OHV use and excluding ROWs with high-profile structures within 1¼ miles of active leks, brooding, and wintering habitat. Managing oil and gas as open to leasing subject to major constraints (NSO) within 2 mile of leks would provide direct protection to leks and important nesting and brood-rearing habitat from surface disturbance associated with oil and gas development and allowing no surface disturbing or disruptive activities within 2 miles of a Greater sage-grouse lek in brood-rearing habitat seasonally would minimize or eliminate disturbance during this sensitive period. Avoiding insecticide use during the early development stages of sage-grouse chicks would increase survivability of chicks.

Management of oil and gas leasing would be the same as described in Alternative A, except that 28,400 acres (393,800 acres less, 93% less, than Alternative A) would be open to oil and gas leasing subject to standard terms and conditions. Impacts from surface disturbance associated with oil and gas exploration and development would be the same as described in Alternative A. Management of areas available for further coal leasing consideration would be the same as described in Alternative A.

Impacts from habitat loss caused by road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would be the same as described for Alternative A. There would be no habitat loss caused by forest and woodland product harvest because such uses would be precluded. The current and anticipated demand for woodland products would not result in an increase of impacts compared to Alternative A.

Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as described in Alternative A.

Designing road crossings to support natural stream processes in areas that support fish would allow for sediment and debris transport that could either enhance or degrade special status fish habitat depending on upstream activities.

Displacement

Not allowing cross-country OHV use would eliminate potential impacts from displacement. In general, OHV use on 884 miles of designated routes that result in increased human presence could temporarily displace special status species. Impacts could include increased stress during critical life history events and site-specific degradation of habitats. Areas closed to OHV use (165,700 acres, 30%), routes closed to OHV use (315 miles), or areas away from designated routes where OHV use is limited to designated routes would avoid impacts associated with disruption and preserve habitat characteristics. Seasonal restrictions on 306 miles of OHV routes for raptor species and deer and elk crucial winter range would provide protection from disturbance and habitat degradation during the closure periods. In addition, access to several open routes would be limited due to the seasonal closures, which would increase protection from disruptive activities compared to Alternatives A and B.

Displacement of special status species during vegetation treatments would be the same as described in Alternative B, except that more acres would be treated. This would result in an increase of short-term displacement immediately following the treatments.

The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could increase the potential for trampling of special status species plants and displace special status species wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site. Implementation plans for each SRMA could include mitigations to avoid special status plant species and minimize trampling of plant species. Increasing management presence in SRMAs (129,050 acres, 23%) would result in decreasing impacts from dispersed recreation activities identified under Alternative A. More of the SRMAs are managed as non-motorized RMZs under Alternative C, which would reduce displacement of special status species wildlife by OHV use. Management of recreation by allowing dispersed camping could result in trampling and removal of special status plant species and would result in minor localized harassment of special status species wildlife due to human presence and disruptive activities.

Negligible impacts would occur by reducing SRP group size to 20 people per group in the remainder of the decision area.

Habitat Maintenance and/or Enhancement

Requiring at least an annual average of 4,650 acres to be treated would help reintroduce natural disturbance rates over the long term. Special status plant species in vegetation communities that are adapted to regular disturbances could benefit from this reintroduction of natural disturbance rates. This would improve habitat values in decadent vegetation communities. Preferring treatment methods that use or mimic natural processes could reduce impacts associated with human presence and more disruptive treatment methods. Special status plant species in vegetation communities that are not adapted to regular disturbances would not be affected because treatments would not be implemented in these areas.

General vegetation management of rehabilitation objectives, including managing for 76 percent or higher of PNC, would maintain or improve available forage and maintain or enhance special status species habitat beyond that of Alternative B. Vegetation management in riparian areas, including increasing the size of buffer zones, would improve special status species habitat conditions, provide direct protection of special status species habitat, and retain adequate water supply to support fisheries compared to Alternative B. Protecting hanging gardens could have similar results in these areas. Restoring sagebrush steppe communities and old-growth forest and woodland stands would be the same as described in Alternative B.

The effects of maintaining ponderosa pine stands using *Best Management Practices for Raptors and Their Associated Habitats* (BLM 2006a) would be the same as described in Alternative B. Management actions for noxious weeds and invasive species would be the same as described in Alternative A, except that using natural processes could decrease temporary habitat disturbances during treatments.

Alternative C would be more restrictive to surface disturbing activities than Alternatives A and B. Areas that are closed to surface disturbing activities (32,700 acres, 6%), open to oil and gas leasing subject to major constraints (NSO), and closed to oil and gas leasing (255,700 acres, 46%), areas withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 158,800 acres, 29%, respectively), closed to mineral material disposals (175,000 acres, 32%), ROW exclusion areas (255,200 acres, 46%), ROW avoidance areas (3,400 acres, <1%), and areas closed to OHV use (165,700 acres, 30%) would protect special status species habitat from such activities. These decisions include restrictions on uses of fish and wildlife habitat, special status species habitat, WC areas, ACECs, SRMAs, WSAs, WSRs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain special status species habitat quality, and reduce or eliminate the effects of displacement from human presence. Protection of fragile soil areas and implementation of erosion control measures would reduce erosion and surface runoff, which could enhance special status species habitat. Applying BMPs to avoid or reduce fragmenting habitat, and mitigating habitat losses for listed and sensitive species at a minimum ratio of 1:1, and at a 2:1 ratio for riparian areas, would be the same as described in Alternative B. In addition, in-kind mitigation would be considered in proximity to the impacted riparian habitats, which could reduce habitat fragmentation and losses for special status species.

Impacts from closing and reclaiming roads, facilities, or improvements would be the same as described in Alternative B. Management actions for soil resources would be the same as described in Alternative B, with the exception of the preclusion of surface disturbance within fragile soils, which would further protect this wildlife habitat. Impacts from water resources would be the same as described under Alternative B, except that managing the discharge of produced waters would focus on onsite beneficial uses to prevent possible degradation of water quality and fisheries.

Management of the plague and other diseases in Utah prairie dog colonies would be the same as described in Alternative B. Protective management measures for the Mexican spotted owl would be the same except that SRP groups would be limited to 8 persons per group and the prohibition of new recreation facilities

or trails would be expanded to within ½ mile of the PAC. This would increase protections of special status species habitat and reduce human presence and disruptive activities to a greater degree than Alternative B.

Precluding timber harvest and limiting woodland harvest would eliminate the potential for disturbances or displacement of special status species. Further excluding riparian areas from woodland harvest would ensure protection of riparian habitats and fisheries.

Grazing management practices, such as implementing grazing systems and range improvements to enhance wildlife, watershed, and riparian values and reducing conflicts with other resources and resource uses, would enhance overall habitat characteristics for many species. Management to mitigate conflicts between grazing and other uses would allow consideration of a reduction in AUMs in areas where conflicts with other uses cannot be mitigated, which could result in less conflict between grazing and other uses than under Alternative B.

Management of ROWs and ROW corridors would be the same as described in Alternative B, except that Alternative C would require the burial of new and reconstructed utility lines and the exclusion of new ROWs with high-profile structures within 1¼ miles of active sage-grouse leks, which would allow for protection of larger areas of wildlife habitat.

The effects of management on disturbance in and adjacent to riparian areas would be similar to Alternative A; however, not allowing surface disturbing activities within 660 feet of riparian/wetlands areas would result in an increase of protection to these areas and associated special status species habitat characteristics. The effects of closing wetland/riparian spring exclosures, sensitive plant exclosures, and some wildlife management areas to grazing would be the same as described in Alternative A.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 147,200 more acres than Alternative A, which would provide the greatest protection to special status species and associated habitat from development activities within these areas.

Special designations (e.g., ACECs, WSAs, and WSRs) management could reduce or eliminate surface disturbance, thereby protecting special status species habitats. Protections aimed at conserving vegetation and limitations on surface disturbing and other disruptive activities would maintain overall habitat conditions. Management of the Cottonwood Canyon ACEC would indirectly provide the greatest protection to special status species habitat characteristics of any alternative from surface disturbances through closure of the area to oil and gas leasing, mineral entry and disposal, OHV use, and new ROWs. Management of the Welsh's Milkweed ACEC would concentrate conservation efforts within important species habitat and indirectly provide the greatest protection to special status species habitat characteristics of any alternative from surface disturbances through oil and gas stipulations on oil and gas leasing subject to major constraints (NSO), closure of the area to mineral entry and disposal, new ROWs, and prohibiting motorized use in the majority of the area. Management of the Vermilion Cliffs ACEC would indirectly provide the greatest protection to special status species habitat characteristics of any alternative from surface disturbances through oil and gas leasing subject to moderate constraints (timing limitations, CSU), closure of the area to mineral entry, closure to new ROWs, and limiting OHV use to designated routes. Management of the White Cliffs ACEC would concentrate conservation efforts within important species habitat and indirectly provide the greatest protection to special status species habitat characteristics of any alternative from surface disturbances through oil and gas stipulations on oil and gas leasing subject to major constraints (NSO), closure of the area to mineral entry and disposal, closure to new ROWs, and limiting OHV use to designated routes. Managing suitable river segments to protect their ORVs would provide more protection to special status species than Alternative A because the

management would be specifically designed to protect values, rather than implemented on a case-by-case basis.

Alternative D

Habitat Alteration, Fragmentation and/or Loss

Cross-country OHV use would be allowed in previously disturbed areas. Although cross-country OHV use would be allowed on more than 1,100 acres (<1%), special status species habitat values would not be impacted because the areas being proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes and ephemeral washes) or human use (Garfield County Motocross, Kaneplex area, and topsoil pit). Continued disturbance in areas previously disturbed by humans would not result in loss of habitat values, causing little to no effects on special status species and associated habitat.

Management of oil and gas leasing would be the same as described in Alternative A. Approximately 391,300 acres (30,900 acres less, 7% less, than Alternative A) would be open to oil and gas leasing subject to the standard terms and conditions. Impacts from surface disturbance associated with oil and gas exploration and development would be the same as described in Alternative A. Management of areas available for further coal leasing consideration would be the same as described in Alternative A. Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as described in Alternative A.

Impacts from habitat loss caused by forest and woodland product harvest, road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would be similar to Alternative A. However, forest and woodland product harvest would be allowed in the entire decision area, while meeting other resource objectives. The current and anticipated demand for forest and woodland products would not result in an increase of impacts compared to Alternative A. Management of woodland product harvest would be similar to Alternative B, except that permitting commercial timber and woodland products harvest while meeting other resource objectives would maintain present habitat conditions. Special status plant species would be protected from the effects of commercial timber and woodland products harvest through site-specific analysis and compliance with resource objectives; however, special status wildlife species could have short-term habitat loss or displacement from these activities.

Alternative D would provide slightly greater protection to Greater sage-grouse habitat than Alternative A, but less protection than Alternatives B and C, by precluding cross-country OHV use and avoiding ROWs with high-profile structures within ¼ mile of active leks. Managing oil and gas as open to leasing subject to major constraints (NSO) within ¼ mile of leks would provide direct protection to leks from surface disturbance associated with oil and gas development, and allowing no surface disturbing or otherwise disruptive activities within 2 miles of Greater sage-grouse lek brood-rearing habitat seasonally would minimize or eliminate disturbance during this sensitive period. Avoiding insecticide use during the early development stages of chicks would increase survivability of chicks.

The effects of designing road crossings to support fish passage in areas that support fish would be the same as for Alternative B.

Displacement

Allowing cross-country OHV use (more than 1,100 acres) on 1,462 miles of designated routes in areas where OHV use is limited to designated routes (525,300 acres, 95%) would result in the displacement of special status species wildlife through the human presence and disruptive activities. In general, use on

designated routes that result in increased human presence could temporarily displace special status species. Impacts could include increased stress during critical life history events and site-specific degradation of habitats. OHV use can alter the seasonal use patterns of many special status species wildlife. Areas closed to OHV use (27,600 acres, 5%) or away from designated routes where OHV use is limited to designated routes would avoid impacts associated with disruption and preserve habitat characteristics. Seasonal restrictions on 2 miles of OHV routes in Pugh Canyon for raptor species would provide protection from disturbance and habitat degradation during the closure period from February 1 to August 31.

Displacement of special status species during vegetation treatments would be the same as described in Alternative B.

The lack of surface disturbing restrictions could greatly increase site-specific displacement and physiological stress to special status species wildlife from human presence and activity during sensitive life stages compared to Alternative A. The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could increase the potential for trampling of special status species plants and displace wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site. Implementation plans for each SRMA could include mitigations to avoid special status plant species and minimize trampling of plant species. Increasing management presence in SRMAs (122,800 acres, 22%) would decrease impacts from dispersed recreation activities identified under Alternative A. In Alternative D, more of the SRMAs are managed for motorized uses, which could increase the displacement of special status species wildlife by OHV use. Management of recreation by allowing dispersed camping could result in trampling and removal of special status plant species and would result in minor localized harassment of special status species wildlife due to human presence and disruptive activities.

The impacts of closing raptor areas to rock climbing would be the same as described under Alternative B. Limiting SRP groups to 20 people per group within wetland or riparian zones, WSAs, and designated critical habitat for special status species, and limiting SRP groups to 40 people per group in the remainder of the decision area could increase disruptive activities, which would increase the potential for displacement of special status species wildlife.

Habitat Maintenance and/or Enhancement

The magnitude of impacts from vegetation treatments would increase compared to Alternative B. Emphasizing commodity production to increase forage and woodland products could benefit livestock and wildlife species that prefer grasses and forbs at the expense of some other uses/values.

General vegetation management of rehabilitation objectives, including managing for 51 percent or higher of PNC, managing hanging gardens, and restoring sagebrush steppe communities and old-growth forest and woodland stands would be the same as described in Alternative B.

The effects of maintaining ponderosa pine stands using *Best Management Practices for Raptors and Their Associated Habitats* (BLM 2006a) would be the same as described in Alternative B. Impacts from managing the plague and other diseases in Utah prairie dog colonies and protective measures for Mexican spotted owl PACs would be the same as described in Alternative B.

Alternative D would be more restrictive to surface disturbing activities than Alternative A. Areas that are closed to surface disturbing activities (19,700 acres, 4%), areas open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing (98,100 acres, 18%), areas withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 7 acres, <1%, respectively),

areas closed to mineral material disposals (21,200 acres, 4%), ROW exclusion areas (75,200 acres, 14%), ROW avoidance areas (15,200 acres, 3%), and areas closed to OHV use (27,600 acres, 5%) would protect special status species habitat from such activities. These decisions include restrictions on uses of fish and wildlife habitat, special status species habitat, SRMAs, WSAs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain special status species habitat quality, and reduce or eliminate the effects of displacement from human presence. Areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (64,600 acres, 12%) would include stipulations to minimize impacts from oil and gas exploration and development to sage-grouse and raptor habitats. Implementation of erosion control measures on 15 percent slopes would reduce erosion and surface runoff, which could enhance special status species habitat. Applying BMPs to avoid or reduce fragmenting habitat and mitigating habitat losses could reduce habitat fragmentation and losses for special status species. In addition, in-kind or out-of-kind mitigation would be considered in proximity to the impacted riparian habitats, which could reduce habitat fragmentation and losses for special status species. Allowing offsite and out-of-kind mitigation would mean that impacted habitats could remain disturbed, resulting in long-term localized habitat losses.

Impacts from closing and reclaiming roads, facilities, or improvements that are no longer necessary would be the same as described in Alternative B. Allowing activities in fragile soil areas could lead to habitat degradation due to developments and increased erosion. Water resources management actions would allow the discharge of produced waters in any manner approved by the State. This could lead to potential degradation of water quality and fisheries. Impacts from management actions for desired future conditions and fish passage on road crossings would be the same as described under Alternative B.

Management to mitigate conflicts between grazing and other uses could provide a mechanism to ensure that habitat deterioration would not occur due to overuse by multiple uses. The effects of closing wetland/riparian spring exclosures, sensitive plant exclosures, and some wildlife management areas to grazing would be the same as described in Alternative A.

Management of ROWs and ROW corridors for the siting and construction of communication towers to meet aircraft safety requirements could lead to the loss of raptors or migratory birds. Managing powerlines to reduce the risk of raptor electrocution or line-strike would reduce raptor injury and mortality.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 14,200 more acres than Alternative A, which would provide more protection to special status species and associated habitat from development activities within these areas.

Providing for no management of lands as ACECs as compared to the other alternatives could affect botanical and biological values by allowing authorized surface disturbing activities within these areas. Not managing 5,600 acres (28.6 miles) of WSR corridors with wildlife ORVs could lead to impairment of these values. However, management associated with riparian areas and other management actions could provide protection of these values.

Summary

Habitat alteration, fragmentation, and/or loss occurs when habitat components needed for species survival (e.g., forage and cover) are removed or when contiguous habitat is broken up (fragmented) by surface disturbing activities. This results in a reduction in usable ranges and disruption of movements among habitats, transitional areas, and breeding areas (Harris 1991).

Displacing activities may not directly affect components, but they force animals to move into less desirable habitat, increasing competition for available resources with other species and uses. Users could introduce noise or dust that could disturb species during sensitive periods, which could indirectly affect reproduction or cause species to abandon areas such as nest sites or areas that contain key habitat components such as important food sources. Stress inflicted on species could also deteriorate species' health, which could affect survivability. Displaced wildlife incurs a physiological cost either through excitement (preparation for exertion) or through locomotion.

Habitat maintenance and/or enhancement occur as a result of vegetation treatments to reduce soil loss, improve crucial big game habitat, restore ecological function, and increase forage production. In general, this vegetation treatments would improve habitat conditions or provide missing habitat components, reduce sedimentation in water sources occupied by special status species, and improve wildlife habitat for special status species with similar forage requirements. These treatments could provide diverse habitats for various special status species.

All alternatives provide protection for special status species and associated habitat. However, Alternative C would cause the least amount of habitat alteration, fragmentation, and/or loss and displacement by providing the least amount of surface disturbance through permitted activities. Alternatives A and D provide the greatest amount of habitat alteration, fragmentation, and loss and displacement due to cross-country OHV use (Alternative A) and the largest acreages available for permitted activity with the least protective restrictions. Alternative C provides the greatest amount of habitat maintenance and enhancement due to species-specific management (particularly for Greater sage-grouse), vegetation treatments that mimic natural processes, management of ACECs, and management of WSR-suitable segments. Alternative B falls between Alternatives A and C in the effects to special status species from surface disturbance resulting in habitat alteration, fragmentation, and/or loss as well as habitat maintenance and enhancement measures. Under all alternatives, special status species habitat within the Alton coal field could be lost over the long term due to surface coal mining activities on and adjacent to these areas.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Implementation of RMP management actions would result in surface disturbing activities, including dispersed recreation, OHV use, mineral and energy development, and ROW development that could result in irreversible or irretrievable loss of wildlife habitat. Irreversible and irretrievable loss of wildlife habitat could reduce the amount of suitable special status species habitat that could be used for expansion. However, management prescriptions and mitigation prescribed under the alternatives are intended to reduce the magnitude of these impacts and restore some of the soil, vegetation, and habitat lost.

Laws protecting threatened and endangered species generally would provide for mitigation of irreversible and irretrievable impacts from permitted activities. Areas open to cross-country OHV use, specifically in designated critical or crucial habitat, could result in the loss of some resources, which would be individually irreversible.

Short-term uses of BLM lands for some permitted activities could affect the long-term sustainability of some special status species habitat. Uses could affect species by displacing animals or removing plants from primary habitats and removing components of these habitats that may not be restored for more than 20 years. For example, because translocation of Greater sage-grouse between populations has not proven successful, long-term loss of sage-grouse habitat due to oil and gas development and other mineral activity could result in the displacement and/or loss of localized sage-grouse populations.

Unavoidable damage to special status species from permitted activities could occur if resources undetected during surveys were identified during ground disturbing activities. In such instances, activities would be ceased on discovery and mitigation would be implemented to minimize further damage to or loss of individuals. Unavoidable loss of species due to non-recognition, lack of information and documentation, and inadvertent damage or use could also occur.

4.2.6 Impacts on Fish and Wildlife Habitat

This section presents potential impacts on fish and wildlife habitat from other management actions based on the existing conditions of fish and wildlife habitat described in Chapter 3. Threatened and endangered species habitat impacts are addressed in the special status species section or in the BA.

Wildlife populations fluctuate, sometimes widely, in response to natural factors such as wildfire, abundance of forage or prey items, and climate extremes such as drought and severe winters. These factors make it difficult to discern potential impacts on wildlife resulting from specific management actions and from impacts caused by natural factors. Changes or stressors to habitat components (e.g., vegetation, water, soil, or air) are likely to cause direct and indirect effects on wildlife and fish. Therefore, potential effects on habitats are the principal focus of this assessment.

Impacts on fish and wildlife include actions that result in habitat alteration, fragmentation, or loss; wildlife displacement; and habitat maintenance and enhancement. Habitat alteration occurs when activities alter the existing habitat character. Surface disturbing activities, such as energy developments, ROWs, road and trail construction, or other activities may reduce habitat quality or lead to habitat alteration, fragmentation, or loss. Habitat alteration, fragmentation, and loss affect the usable ranges and routes for wildlife movement. Wildlife displacement occurs when land use activities result in the movement of wildlife into other habitats, increasing stress on individual animals, and increasing competition for habitat resources. Impacts on fish and wildlife from displacement depend on the location, extent, timing, and/or the intensity of the disruptive activity or human presence. Occurrence of these disruptive activities over an extended period of time in areas on or adjacent to fish and wildlife habitat could cause either temporary or permanent displacement of wildlife. Impacts from displacement would be greater for those fish or wildlife species with limited existing habitat and/or a low tolerance for disturbance. Habitat maintenance or enhancement can maintain or improve vegetative conditions, reduce soil loss, improve soil water-holding capabilities, control the spread of invasive species, and restore ecological integrity.

The following assumptions were used in the analysis:

- If monitoring reveals that mitigation is unsuccessful in reducing or eliminating impacts, immediate measures to prevent further impacts would be implemented as appropriate to the species affected.
- Impacts on big game populations that exceed the current population objective levels would not be considered significant if the impacts would not reduce the populations below the objective levels.
- Sufficient habitat exists to maintain current fish and wildlife population objectives.
- Disruptive activities would displace wildlife, although some wildlife adaptation would occur.

Under all alternatives, impacts on fish and wildlife are not anticipated as a result of implementing management actions for the following resources and designations: air quality and other designations.

Impacts Common to All Alternatives

Habitat Alteration, Fragmentation, and/or Loss

Fire management activities have the potential to directly and indirectly affect fisheries and wildlife habitat throughout the decision area, depending on treatment timing, extent, location, elevation, duration, fuel, severity of fires, and habitat type or vegetation community and soil type of treated area. Effects to vegetation have the potential to directly or indirectly affect fish and wildlife species that inhabit them or areas adjacent to (or downstream from) them.

Resource protection measures would limit short-term and long-term impacts on fisheries and aquatic resources from wildland fire. Direct effects may result from the introduction of fire retardant, aviation fuel, or lubricants into streams and wetlands; erosion of exposed soils from fire line construction on steep slopes adjacent to streams; damaged riparian vegetation and soils (resulting in erosion) from the use of heavy equipment and establishment of fire camps; or reduced natural stream flow during water drafting and pumping. These impacts could degrade the water quality of fisheries. The collective short-term impacts of increased sedimentation (from erosion) could have watershed-wide adverse effects, including changes in temperature, turbidity, and water chemistry. Because actions to protect resources and project-specific analyses would limit impacts of prescribed fire and would place constraints on non-fire fuel treatments in and adjacent to wetlands, riparian zones, and water habitats, short-term impacts from these fire management activities would be minimized or eliminated. Over the long term, wildland fire management actions would reduce the risk of severe wildland fire and associated suppression activities.

Wildland fire likely would affect suitable habitat used by raptors, migratory birds, small mammals, carnivores and predators, amphibians and reptiles, and a variety of habitats used by upland big game species. Resource protection measures would minimize short-term impacts on non-game and big game species (e.g., direct species mortality, habitat destruction, and habitat displacement). Direct effects from wildland fire suppression could include damaged vegetation (including forage resources) from the use of heavy equipment and establishment of fire camps, weed invasion, an increase in acres of undesirable habitat types, and a decrease in understory diversity and overall species richness (Adams and Simmons 1999). These effects could cause species displacement and potential mortality. Indirect impacts could include changes in the survival or successful reproduction of aquatic prey species (e.g., for birds and carnivores) due to increased sedimentation and subsequent habitat modification as a result of upstream erosion.

Resource protection measures would be considered and implemented, as appropriate, for wildland fire use and planned actions, and direct impacts on raptors and migratory birds would be limited to those associated with wildfire suppression activities. These include mortality, habitat destruction, and temporary displacement. Indirect impacts could include short-term reduction in available prey sources. Raptors and migratory birds that are found in desert and riparian/wetland habitats would be more likely to incur project-related impacts because these habitats are relatively far-removed from their natural fire regimes.

Over the long term, mortality or long-term displacement of species likely would be reduced because wildland fire use and prescribed fire would not likely consist of large fires, and rehabilitation would be implemented as necessary and appropriate. Populations could be displaced for longer periods of time if management activities were implemented repeatedly within the same treatment area (e.g., mechanical treatment followed by prescribed fire followed by biological treatment). Long-term effects on habitat would include a gradual increase in species diversity that would more closely reflect conditions associated with a natural fire regime.

Wildlife habitat contained within the Alton area could be lost due to surface coal mining activities on and adjacent to 3,600 acres. Reclamation activities, beginning within 3 years of initial disturbance, would begin to reestablish wildlife habitat in the disturbed areas. On average, 100 acres would be reclaimed per year. Sagebrush communities that are disturbed/removed take 20–100 years to reestablish; therefore, successful mitigation could result in the restoration of habitat values over the long term.

Locating ROWs in common would result in concentrated surface disturbances and habitat deterioration or loss causing species to seek alternative habitats. Locating ROWs in common could actually increase habitat loss or fragmentation if improperly located through habitat.

Authorized excavation of cultural sites, paleontological localities, or cultural inventories would have 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.

Displacement

Dispersed recreation activities could impact fish and wildlife species by introducing noise that could disturb species during sensitive periods. This could indirectly affect reproduction or cause species to abandon areas such as nest sites or areas that contain key habitat components such as important food sources. Effects would be greater in areas that receive frequent and/or intense recreation use. Areas subject to more visitation would include easily accessible locations, such as along major roads, near communities, or in areas that offer attractive opportunities for recreation. Although damage to fish and wildlife habitats would continue to be monitored, detrimental effects from casual use would not be apparent until after the damage has occurred, which would then be appropriately mitigated to the extent practical and feasible.

The possibility of increased human presence in areas of additional interpretive sites for cultural resources and public education and developed recreation sites could displace wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site.

Oil and natural gas production could result in the use of pits to separate oil from produced water or to evaporate large volumes of water with high levels of total dissolved solids (TDS). Birds are attracted to these pits because they mistake them for natural bodies of water. The sticky oil then entraps the birds in the pits and they die from exposure and exhaustion. Birds that do manage to escape can die from starvation or experience impaired reproduction caused by the toxic effects of oil ingested during preening. Scavengers and predators can also suffer adverse effects from consuming oiled birds. Pits or ponds containing hypersaline water can pose a mortality threat to migratory birds through ingestion of toxic brine, susceptibility to avian botulism, and sodium crystallization on feathers, which destroys thermoregulatory and buoyancy functions. It is BLM standard practice that pits containing harmful fluids be maintained in a manner that prevents migratory bird mortality, thus eliminating potential effects.

Habitat Maintenance and/or Enhancement

Applying *Standards for Rangeland Health* to all rangelands and *Guidelines for Grazing Management in BLM Lands in Utah* (BLM 1997a) for rehabilitation of rangelands would offer protection for fish and wildlife habitat by maintaining or improving the ecological health and condition of rangeland ecosystems. Using livestock grazing to enhance ecosystem health or mitigate resource problems (e.g., noxious/ invasive weed control and hazardous fuel reduction) where supported by site-specific environmental analysis could result in enhancement of overall wildlife habitat and over the long term could decrease invasive species. Continuing to implement noxious weed and invasive species control measures would maintain or improve fish and wildlife habitat, but could cause localized temporary disturbances during control measures.

Management actions associated with water quality and watershed health, soils, and fish and wildlife, including BMPs, protection of culinary water supplies, and water source protection zones, could maintain or improve riparian habitat conditions and fisheries. Management of riparian areas through project design features or stipulations and water retention would maintain or improve riparian habitat conditions and retain adequate water supply. Implementing BMPs designed to minimize detrimental impacts on soils for ground disturbing activities would reduce the potential for localized habitat deterioration that may occur.

Management outlined in the *Paria Canyon–Vermilion Cliffs Wilderness Plan* and interim management policy (IMP) (in WSAs) would indirectly protect and enhance habitat characteristics of species such as raptors, fish, and big game.

Alternative A

Habitat Alteration, Fragmentation, and/or Loss

Habitat fragmentation occurs when a contiguous habitat is broken up (fragmented) by surface disturbing activities. This may cause a reduction in usable ranges and disruption of movements among crucial habitats (Harris 1991). Allowing oil and gas leasing subject to the standard terms and conditions on 422,200 acres (76%) could result in fragmentation through the reduction of usable habitat and disruption of movement among habitats, transitional areas, and parturition areas associated with the construction of access roads, facilities, and wells depending on the location and timing of development. Oil and gas exploration and development activities would disturb approximately 2,976 acres over 20 years, which would constitute approximately 1 percent of the planning area. Approximately 2,370 acres would be reclaimed within 20 years. Wildlife habitat not reclaimed (606 acres) in these areas would be lost due to oil and gas exploration and development. Overall, effects on fish and wildlife habitat would be relatively minor over the entire planning area.

Forest and woodland product harvest, cross-country OHV use (466,600 acres, 84%), road construction, facility construction, mineral development and construction of associated facilities, and ROW construction could reduce a source of cover for small mammals and reptiles, habitat for birds, and big game winter range and parturition areas. Concentrated cross-country OHV use could remove existing vegetation, which would result in increased runoff, thus reducing wildlife and fisheries habitat quality. Surface disturbing activities could increase sediment delivery to streams, which could interfere with the life history requisites of fish.

Management of locatable minerals and mineral materials would result in short-term and direct impacts on wildlife and associated habitat through surface disturbance and habitat loss; however, impacts would be minimal. Impacts from locatable mineral development would be minimal because a plan of operation, including a reclamation plan, is required for all mining claim disturbances. The development of locatable minerals and mineral materials would disturb approximately 1,050 acres over 20 years. The development of locatable minerals and mineral materials could cause localized impacts on wildlife through the disturbance of habitat.

Dispersed recreation activities and access along routes could introduce and spread noxious and invasive weeds. The change in vegetation composition could affect wildlife through loss of habitat, reduction in habitat diversity and forage, and increased foraging by wildlife into other areas that might have less value as habitat.

Not requiring road crossings to support fish passage could eliminate the possibility of areas being recolonized from a neighboring population and prevent natural movement of fish populations in fisheries. This could also provide separation of native fish species from more aggressive introduced species.

Displacement

Displacement from surface disturbance or disruptive activities moves animals into less desirable habitat and increases competition for available resources with other species and uses. Impacts of human activity on big game crucial winter range include habitat and forage loss caused by surface disturbing and other disruptive activities at any time of the year. Indirect impacts on wildlife occur from displacement and physiological stress from human presence and activity during sensitive life stages. Disturbed big game

incurs a physiological cost either through excitement (preparation for exertion) or through locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to poorer (lower) quality habitat. Chronic or continuous disturbance could result in reduced animal fitness and reproductive potential (Geist 1978). Dispersed recreation activity, mineral exploration and development, and ROW development could result in displacement and physiological stress to wildlife from human presence and activity during sensitive life stages. Continued increases in recreation use without additional management presence could result in further dispersion of recreation users, increasing the potential for wildlife displacement.

Vegetation treatments would result in temporary displacement of wildlife that uses the treatment areas for a portion of their life cycle. Some species would recover quickly and would reoccupy the sites, although others may be displaced for a long term, until the habitat conditions required by the species become reestablished.

Allowing cross-country OHV use (466,600 acres) on 55 miles of designated routes in areas where OHV use is limited to designated routes (66,200 acres) would result in the displacement of wildlife through human presence and disruptive activities. In general, travel management activities that result in increased human presence would have a localized impact on fish and wildlife species. Impacts could include increased displacement of wildlife, increased stress during critical time periods, and degradation of habitats. OHV use can alter the seasonal use patterns of many wildlife species. Of particular concern are raptor nesting sites, big game parturition areas, and winter habitats. Areas closed to OHV use (21,200 acres) or away from designated routes where OHV use is limited to designated routes would avoid impacts associated with the disruption of wintering big game and preserve habitat characteristics. Seasonal restrictions on 2 miles of OHV routes in Pugh Canyon for raptor species would provide protection from disturbance and habitat degradation during the closure period from February 1 to August 31.

Habitat Maintenance and/or Enhancement

Vegetation treatments would result in short-term reduction of habitat values (e.g., forage and shelter) until vegetation communities are reestablished. In addition, wildlife would be temporarily displaced during vegetation treatments. However, over the long term the treated areas would provide improved forage conditions and reduced erosion, which would enhance wildlife habitat and fisheries. Vegetation manipulation to improve wildlife habitat would include livestock grazing strategies and wildland fire techniques, and using biological, chemical, and mechanical controls. Vegetation treatments would improve the diversity of vegetation age classes and 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 that require expansive tracts of contiguous late-successional habitat. The use of desired species in general vegetation treatments would provide a variety of species for forage and browse, supporting wildlife species. Management of riparian areas would enhance habitat by protecting sensitive riparian habitats from activities such as livestock grazing, mineral development, and surface occupancy or disturbance within 400 feet of riparian areas.

Areas that are closed to surface disturbing activities (14,900 acres, 3%), open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing (80,600 acres, 14%), withdrawn from locatable mineral entry (24,591 acres, 4%), closed to mineral material disposals, and closed to OHV use (21,200 acres, 4%) would protect fish and wildlife habitat from surface disturbance and disruptive activities. These decisions include restrictions on uses of fish and wildlife habitat, ACECs, WSAs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain fish and wildlife habitat quality, and reduce or eliminate the effects of displacement from human presence. Areas

open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (51,200 acres, 9%) would include stipulations to minimize impacts from oil and gas exploration and development to big game habitats. Protection of fragile soil areas and implementation of erosion control measures would reduce erosion and surface runoff, which could enhance fish and wildlife habitat.

The effects of livestock grazing on wildlife could include direct competition for forage, water, and space, and indirect habitat alteration through range improvements. The impacts of livestock grazing management on stream processes and fish habitats have been well documented (Armour 1991, White 1996, Rinne 1999). These impacts include the short-term and site-specific loss of stabilizing riparian vegetation, which can lead to stream instability and an associated loss of habitat complexity, the loss of shading vegetation, which can lead to elevated stream temperatures and increased sediment delivery, and the loss of stream channel complexity provided by fluvial process and woody debris. These impacts could vary depending on livestock grazing intensity, site characteristics, and species habitat requirements. Improving livestock grazing allotments to meet the *Standards for Rangeland Health* and the *Guidelines for Grazing Management on BLM Lands in Utah* would over the long term enhance fish and wildlife habitat by increasing the amount of desirable vegetation cover, structure, and species diversity, which would also improve water quality, aquatic species habitat, and wildlife species diversity. Closing wetland/riparian spring exclosures, sensitive plant exclosures, and some wildlife management areas to grazing would eliminate the potential for short-term impacts.

Prohibiting cutting of standing ponderosa pine would protect habitat for wildlife species and prevent soil loss, enhancing fishery health. However, it could also eliminate the opportunity to implement vegetation treatments that could improve the health of ponderosa pine stands.

Restriction on landscape modifications in VRM Class I and II areas would limit development on 121,100 acres (22%). Management to preserve (VRM Class I objectives) and retain (VRM Class II objectives) the landscape would indirectly provide long-term preservation of wildlife habitat characteristics. Managing eligible river segments to protect their ORVs, free-flowing nature, and tentative classification would indirectly protect associated fish and wildlife habitat values in these areas.

Management prescriptions associated with ACECs would restrict surface uses that could otherwise result in habitat removal and degradation. Continuing to manage the Water Canyon/South Fork Indian Canyon ACEC (220 acres) as a VRM Class II area and requiring oil and gas leasing subject to major constraints (NSO) stipulations on new leases would reduce the extent of surface disturbance in the ACEC and thereby reduce related habitat removal and disturbance.

Managing eligible river segments to protect their ORVs, free-flowing nature, and tentative classification would provide direct protection to wildlife ORVs within 5,600 acres of river corridors (28.6 miles).

Alternative B

Habitat Alteration, Fragmentation, and/or Loss

Impacts from the management of oil and gas leasing would slightly decrease compared to Alternative A because more wildlife habitat would be protected by additional stipulations on oil and gas exploration and development. Approximately 263,400 acres (158,800 acres less, 38% less, than Alternative A) would be open to oil and gas leasing subject to standard terms and conditions. Impacts from surface disturbance associated with oil and gas exploration and development would be the same as for Alternative A.

The magnitude of impacts from habitat loss caused by forest and woodland product harvest, areas open to cross-country OHV use (1,100 acres, <1%), road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would decrease slightly compared to

Alternative A. Forest and woodland product harvest would be allowed in the entire decision area on a case-by-case basis and cross-country OHV use would be allowed in previously disturbed areas. The current and anticipated demand for forest and woodland products would not result in an increase of impacts compared to Alternative A. Although cross-country OHV use would be allowed on more than 1,100 acres (<1%), fish and wildlife habitat values would not be impacted because the areas being proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes) or human use (e.g., sand dunes and topsoil pits). In these areas, continued disturbance of previously disturbed areas would not result in additional loss of habitat values.

Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as for Alternative A.

Designing road crossings to support fish passage in areas that support fish would allow for areas to be recolonized from a neighboring population and allow natural movement of fish populations in fisheries. This could also allow for more aggressive introduced species into native fish population habitat.

Displacement

The magnitude of impacts from dispersed recreation activity, mineral exploration and development, and ROW development would slightly decrease compared to Alternative A. Seasonal restrictions on surface disturbing activities during sensitive life stages, including in lambing, breeding, and fawning seasons and in crucial deer and elk winter, migration, and transitional ranges would decrease the possibility of displacement and physiological stress to wildlife from human presence and activity during these sensitive life stages compared to Alternative A. The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could displace wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site. Increasing management presence in SRMAs (125,800 acres, 23%) would decrease impacts from dispersed recreation activities identified under Alternative A. Allowing dispersed camping would result in minor localized harassment of wildlife due to human presence and disruptive activities.

Displacement of wildlife during vegetation treatments would be the same as for Alternative A, except that more acres could be treated. This could result in an increase of short-term displacement immediately following the treatments. However, over the long term, the treated areas would provide improved habitat conditions and reduced erosion, which would enhance habitat for wildlife and fish. If less than an annual average of 4,650 acres were treated, shrublands generally would convert into woodlands and reduce understory vegetation. The loss of understory vegetation could, over the long term, decrease forage species, but increase habitat for species dependent on pinyon-juniper woodlands.

Allowing cross-country OHV use on 1,100 acres and on 1,385 miles of designated routes in areas where OHV use is limited to designated routes (524,000 acres, 95%) would result in effects similar to those described under Alternative A; however, severely reducing the area available for cross-country OHV use would reduce the overall effect on wildlife from OHV use. Areas closed to OHV use (28,900 acres, 5%) or away from designated routes where OHV use is limited to designated routes would avoid impacts associated with the disruption of wintering big game and preserve habitat characteristics. The effects of seasonal restrictions on raptor species in Pugh Canyon would be the same as for Alternative A.

Closing raptor areas to rock climbing could result in the elimination of long-term disruptive effects on nesting activities during sensitive periods, which could indirectly affect reproduction and cause species to not abandon areas. Limiting SRP groups to 12 people per group within wetland/riparian zones, WSAs, and designated critical habitat for special status species, and limiting SRP groups to 25 people per group in the remainder of the decision area could reduce wildlife displacement from large groups. These actions

would enhance the overall health of the habitat as compared to Alternative A, which has no limitations on rocking climbing or SRP group size.

Habitat Maintenance and/or Enhancement

Focusing vegetation treatments in identified high-priority areas and increasing the potential treatment acres would target areas where habitat function could be most improved. This would result in an increase in habitat components, including increased forage and shelter. Vegetation treatments on an average of no more than 22,300 acres annually could maintain natural disturbance rates, providing for greater habitat diversity than Alternative A; however, if less than an annual average of 4,650 acres were treated, then habitat values, including forage and shelter, may not function within their natural disturbance regimes, altering the value of the habitat. In addition, treatments associated with maintaining or restoring special status species habitat could improve wildlife habitat in the same area.

General vegetation management of rehabilitation objectives, including managing for 51 percent or higher of PNC, would maintain available forage and maintain or enhance wildlife habitat. Vegetation management in riparian areas and hanging gardens would maintain or improve fish and wildlife habitat conditions, provide direct protection of fish and wildlife habitat, and retain adequate water supply to support fisheries. Restoring sagebrush steppe communities and maintaining old-growth forest and woodland stands could improve the long-term ecological health and habitat condition and help support diverse wildlife and sagebrush-obligate species and their food sources. Treatments for sagebrush steppe restoration could cause temporary disturbances to wildlife occupying these areas.

Alternative B would be more restrictive to surface disturbing activities than Alternative A. Areas that are closed to surface disturbing activities (19,700 acres, 4%), open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing (133,900 acres, 24%), areas withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 9,500 acres, 2%, respectively), closed to mineral material disposals (78,500 acres, 14%), ROW exclusion areas (75,700 acres, 14%), ROW avoidance areas (78,900 acres, 14%), and areas closed to OHV use (28,900 acres, 5%) would protect fish and wildlife habitat from surface disturbance and disruptive activities. These decisions include restrictions on uses of fish and wildlife habitat, special status species habitat, ACECs, SRMAs, WSAs, WSRs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain fish and wildlife habitat quality, and reduce or eliminate the effects of displacement from human presence. Areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (156,700 acres, 28%) would include stipulations to minimize impacts from oil and gas exploration and development on big game crucial winter, migration, and transitional ranges, on Desert bighorn sheep lambing and fawning seasons, and on seasonal buffers for raptor habitat. Protection of fragile soil areas and implementation of erosion control measures would reduce erosion and surface runoff, which could enhance fish and wildlife habitat. Applying BMPs to avoid or reduce fragmenting habitat and mitigating habitat losses for listed and sensitive species at a minimum ratio of 1:1 for uplands and at a 2:1 ratio for riparian areas could avoid and reduce habitat fragmentation and losses for fish and wildlife. In addition, in-kind mitigation would be considered in proximity to the impacted riparian habitats, which could reduce habitat fragmentation and losses.

Closing and reclaiming roads, facilities, or improvements that are no longer necessary could deter continued use of the area, resulting in reduced disturbance to fish and wildlife habitat. Reclaiming roads would enhance wildlife habitat through removal of disturbed areas, increases in forage, and reduced habitat fragmentation.

The magnitude of impacts on fragile soil areas would decrease compared to Alternative A. Incorporating erosion control measures on slopes greater than 15 percent would further reduce erosion and surface

runoff, which could enhance fish and wildlife habitat. In addition, cooperative implementation of the *Upper Sevier Watershed Management Plan*, managing the Sevier River in accordance with the TMDL, and avoiding or minimizing impacts on water quality could maintain or improve the conditions of fisheries. Managing the discharge of produced waters, including no surface discharge in the Colorado River Basin, would maintain fish and wildlife habitat by preventing possible degradation of water quality and fisheries.

Management of the plague and other diseases in Utah prairie dog colonies could reduce the spread of plague in chipmunks and ground squirrels. Protective management measures for the Mexican spotted owl, including prohibiting new recreation facilities or trails within PACs, seasonal closures of existing facilities, and limiting SRP groups to 12 persons or less per group would protect and enhance fish and wildlife habitat and reduce human presence and disruptive activities.

Management actions for desired future conditions of important wildlife and fish habitat would improve habitat conditions, especially deer winter range and sagebrush habitats, by maintaining and prioritizing habitat vegetation treatments in areas of crucial deer and Greater sage-grouse winter range and sage-grouse brood-rearing habitat. Providing for fish passage on road crossings would minimize impacts on population function and interaction.

Management of habitat to provide for wildlife management objectives, authorization of wildlife habitat improvement projects, and retaining crucial wildlife habitat in public ownership would protect or enhance fish and wildlife habitat and provide key habitat components. However, this could cause temporary disturbances during project construction. Fish and wildlife translocation, transplantation, augmentation, and reestablishment would allow for management flexibility to ensure healthy wildlife populations.

Permitting commercial forest and woodland product harvest for the purpose of promoting forest health would improve the long-term health of forest habitats. However, this could cause temporary disturbances or displacement during project implementation. Management actions for woodland product harvest by closing WSAs to harvest, except for incidental collection for onsite campfire use and administrative purposes, would provide a source of cover and habitat for prey species and ensure a prey base for raptors and other predators. Permitting woodland product harvesting in riparian areas in proper functioning condition for maintenance and/or improvement of riparian ecosystems could provide long-term habitat enhancement through overall forest health and habitat diversity.

Management of forage allocation by allocating 11,093 AUMs to wildlife throughout the decision area and reallocating 48 AUMs on the Water Canyon Allotment to wildlife would provide an increased amount of forage allotted to ungulate and other species in the Water Canyon Allotment. Management to mitigate conflicts between grazing and other uses could provide a mechanism to ensure that habitat deterioration would not occur due to overuse by multiple uses.

Management of ROWs and ROW corridors for the siting and construction of communication towers with consideration of measures to avoid and minimize impacts on migratory birds likely would minimize or eliminate loss of migratory birds from guy wires and other associated features of communication towers. Managing powerlines to reduce the risk of raptor electrocution or line-strike would reduce raptor injury and mortality. In addition, burying new and reconstructed utility lines could further reduce electrocution risk to raptors and collision potential for migratory birds.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 48,500 more acres than Alternative A.

Management prescriptions associated with ACECs would restrict surface uses that could otherwise result in loss and disturbance of habitat. Managing the Cottonwood Canyon ACEC (3,800 acres) as a VRM Class II area and requiring NSO stipulations on new leases would reduce the extent of surface disturbance in the ACEC in upland, riparian, and forest and woodlands habitat.

Managing suitable river segments to protect their ORVs, free-flowing nature, and tentative classification would provide direct protection to wildlife ORVs within 4,550 acres of river corridors (23.7 miles) (1,050 acres less, 19% less, than Alternative A).

Alternative C

Habitat Alteration, Fragmentation, and/or Loss

The magnitude of impacts from the management of oil and gas leasing would further decrease compared to Alternative A because more wildlife habitat would be protected by additional stipulations on oil and gas exploration and development. Alternative C would help protect the greatest amount of habitat. Approximately 28,400 acres (393,800 acres less, 93% less, than Alternative A) would be open to oil and gas leasing subject to the standard terms and conditions. Impacts from surface disturbance associated with oil and gas exploration and development would be the same as for Alternative A.

Impacts from habitat loss caused by road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would be the same as for Alternative A. There would be no habitat loss caused by forest and woodland product harvest or areas open to OHV use because these uses would be precluded. The current and anticipated demand for woodland products would not result in an increase of impacts compared to Alternative A.

Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as for Alternative A.

Designing road crossings to support natural stream processes in areas that support fish would allow for sediment and debris transport that could either enhance or degrade fisheries habitat, depending on upstream activities.

Displacement

Impacts from dispersed recreation activity, mineral exploration and development, and ROW development would decrease compared to Alternative A. Seasonal restrictions on surface disturbing activities during sensitive life stages, including in lambing, breeding, and fawning seasons, in big game crucial and high-value winter, migration, and transitional ranges, in Desert bighorn sheep lambing and fawning seasons, and in seasonal buffers for raptor habitat would decrease the possibility of displacement and physiological stress to wildlife from human presence and activity during these sensitive life stages compared to Alternative A. The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could displace wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site. Increasing management presence in SRMAs (129,050 acres, 23%) would result in decreasing impacts from dispersed recreation activities identified under Alternative A. More of the SRMAs are managed as non-motorized RMZs, which would reduce displacement of wildlife by OHV use. Management of recreation by allowing dispersed camping would result in minor localized harassment of wildlife due to human presence and disruptive activities.

Displacement of wildlife during vegetation treatments would be the same as for Alternative B, except an annual average of at least 4,650 acres (93,000 acres over the life of the plan), not to exceed an annual

average of 22,300 acres (446,000 acres over the life of the plan), and using preferred treatment methods that mimic natural process (e.g., prescribed fire, biological, and hand cutting) likely would result in a slower process of vegetation enhancement compared to Alternatives A and B. This would result in an increase of short-term displacement immediately following the treatments. The slower rate of vegetation enhancement would allow fish and wildlife to adapt to the vegetation changes with less displacement.

Not allowing cross-country OHV use would eliminate potential impact from displacement. This is not anticipated to decrease impacts compared to Alternative B. In general, travel management activities that result in increased human presence would have a localized impact on fish and wildlife species. Impacts could include increased displacement of wildlife, increased stress during critical time periods, and degradation of habitats. OHV use can alter the seasonal use patterns of many wildlife species. Of particular concern are raptor nesting sites, big game parturition areas, and winter habitats. Areas closed to OHV use (165,700 acres, 30%) or away from 884 miles of designated routes where OHV use is limited to designated routes would avoid impacts associated with the disruption of wintering big game and would preserve habitat characteristics. Seasonal restrictions on 306 miles of OHV routes for raptor species and deer and elk crucial winter range throughout the decision area would provide protection from disturbance and habitat degradation during the closure periods. In addition, access to several open routes would be limited due to the seasonal closures, which would increase protections from disruptive activities compared to Alternative B.

Management of general recreation would be the same as for Alternative B. The effects of reducing the size of SRP groups to 20 people per group outside wetland/riparian zones, WSAs, and designated critical habitat for special status species, would be negligible.

Habitat Maintenance and/or Enhancement

Impacts from vegetation treatments would be similar to Alternative A, but focusing treatments in identified high-priority areas and increasing the potential treatment acres would target areas where habitat function could be most improved. This would result in an increase in habitat components, including increased forage and shelter. Vegetation treatments on an average of no more than 22,300 acres annually could maintain natural disturbance rates, providing for greater habitat diversity than Alternative A. Requiring vegetation treatments on at least an annual average of 4,650 acres would reintroduce natural disturbance rates. This would improve habitat values in decadent vegetation communities. Emphasizing treatment methods that use or mimic natural processes could reduce impacts associated with human presence and more disruptive treatment methods. However, using treatment methods that mimic natural process would be preferred (e.g., prescribed fire, biological, and hand cutting) and likely would result in a slower process of vegetation enhancement. Although the same level of ecological condition could be reached over the long term, the rate of recovery likely would be reduced.

General vegetation management of rehabilitation objectives, including managing for 76 percent or higher of PNC would maintain or improve available forage and maintain or enhance wildlife habitat beyond Alternative B. Vegetation management in riparian areas and hanging gardens, including increasing buffer zones, would improve fish and wildlife habitat conditions, provide direct protection of fish and wildlife habitat, and retain adequate water supply to support fisheries compared to Alternative B. Restoring sagebrush steppe communities and old-growth forest and woodland stands would be the same as for Alternative B.

Alternative C would be more restrictive to surface disturbing activities than Alternatives A and B. Areas that are closed to surface disturbing activities (32,700 acres, 6%), areas open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing (255,700 acres, 46%), areas withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 158,800 acres, 29%, respectively), areas closed to mineral material disposals (175,000 acres, 32%), ROW exclusion areas

(255,200 acres, 46%), ROW avoidance areas (3,400 acres, <1%), and areas closed to OHV use (165,700 acres, 30%) would protect fish and wildlife habitat from surface disturbance and disruptive activities. These decisions include restrictions on uses of fish and wildlife habitat, special status species habitat, WC areas, ACECs, SRMAs, WSAs, WSRs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain fish and wildlife habitat quality, and reduce or eliminate the effects of displacement from human presence. Areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (269,900 acres, 49%) would include stipulations to minimize impacts from oil and gas exploration and development in big game crucial and high-value winter, migration, and transitional ranges, in Desert bighorn sheep lambing and fawning seasons, and in seasonal buffers for raptor habitat. Protection of fragile soil areas and implementation of erosion control measures would reduce erosion and surface runoff, which could enhance fish and wildlife habitat. Applying BMPs to avoid or reduce fragmenting habitat, and mitigating habitat losses for listed and sensitive species at a minimum ratio of 1:1, and at a 2:1 ratio for riparian areas, would be the same as for Alternative B. In addition, in-kind mitigation would be considered in proximity to the impacted riparian habitats, which could reduce habitat fragmentation and losses for fish and wildlife.

Impacts from closing and reclaiming roads, facilities, or improvements would be the same as described in Alternative B. Management actions for soil resources would be the same as for Alternative B, with the exception of the preclusion of surface disturbance within fragile soils, which would further protect this wildlife habitat. Impacts from water resources would be the same as described under Alternative B, except that managing the discharge of produced waters would focus on onsite beneficial uses to prevent possible degradation of water quality and fisheries.

Management actions for noxious weeds and invasive species would be the same as for Alternative A, except that using natural processes could decrease temporary habitat disturbances during treatments.

Management of desired future conditions of important wildlife and fish habitat would be the same as for Alternative B, except that road crossings would emphasize natural environments that supplement key habitat components. Management of the plague and other diseases in Utah prairie dog colonies would be the same as for Alternative B. Protective management measures for the Mexican spotted owl would be the same, except that the size of SRP groups would be reduced to eight people and that the prohibition of new recreation facilities or trails would be expanded to within ½ mile of the PAC. This would increase protection of fish and wildlife habitat and reduce human presence and disruptive activities to a greater degree than Alternative B.

Fish and wildlife translocation, transplantation, augmentation, and reestablishment would be the same as for Alternative B. Management of habitat to provide for wildlife management objectives would be the same as for Alternative B, except that all crucial wildlife habitats would be retained, which would ensure habitat protection.

Precluding timber harvest and limiting woodland harvest would eliminate the potential for disturbances or displacement of wildlife. Further excluding riparian areas from woodland harvest would ensure protection of riparian habitats and fisheries.

Management of forage allocations to provide big game species would be the same as for Alternative B, except that 11,045 AUMs would be allocated to wildlife and no AUMs for livestock would be allocated for the Water Canyon Allotment. Allocating no AUMs for livestock on the Water Canyon Allotment could increase fawning potential of mule deer, but the area is so small that the effects would be negligible.

Grazing management practices such as implementing grazing systems and range improvements to enhance wildlife, watershed, and riparian values and reducing conflicts with other resources would enhance overall habitat characteristics for all species. Management for mitigating conflicts between grazing and other uses would be the same as for Alternative B. Not implementing range treatments for livestock grazing would allow for natural forage production.

Management of ROWs and ROW corridors would be the same as for Alternative B, except for requiring the burial of new and reconstructed utility lines and the exclusion of new ROWs with high-profile structures within 1¼ miles of active Greater sage-grouse leks, which would allow for protection of larger areas of wildlife habitat.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 147,200 additional acres.

The Cottonwood Canyon ACEC (3,800 acres), Welsh's Milkweed ACEC (1,300 acres), White Cliffs ACEC (26,000 acres), Vermilion Cliffs ACEC (23,400 acres), and Parunuweap Canyon ACEC (6,100 acres) would all be managed as VRM Class I or Class II, closed or recommended for withdrawal from mineral entry, and closed or avoidance areas for new ROWs. This would greatly reduce the extent of surface disturbance and thereby reduce possible related habitat loss, as compared to Alternative A. In addition, the Cottonwood Canyon, Welsh's Milkweed, White Cliffs, and Parunuweap Canyon ACECs would be either closed to mineral development or stipulated as NSO areas, which would further reduce the potential for surface disturbance in these areas.

Impacts from managing WSR corridors would be similar to those described under Alternative A because all 15 eligible river segment corridors (9,230 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification. However, land use allocations in Alternative C would be consistent with protective management, reducing the potential for surface disturbing activities.

Alternative D

Habitat Alteration, Fragmentation, and/or Loss

The magnitude of impacts on wildlife habitat from the management of oil and gas leasing could slightly decrease because more wildlife habitat would be protected by additional stipulations on oil and gas exploration and development than in Alternative A. Approximately 391,300 acres (30,900 acres less, 7 percent less, than Alternative A) would be open to oil and gas leasing subject to standard terms and conditions. Impacts from surface disturbance associated with oil and gas exploration and development would be the same as for Alternative A.

Impacts from forest and woodland harvest, areas open to cross-country OHV use (more than 1,100 acres, <1%), road construction, facility construction, mineral development and construction of associated facilities, and ROW construction would be similar to Alternative A, except that harvest would be allowed in the entire decision area while meeting other resource objectives. The current and anticipated demand for forest and woodland products would not result in an increase of impacts compared to Alternative A. Cross-country OHV use would be allowed in previously disturbed areas. Although cross-country OHV use would be allowed on more than 1,100 acres (<1%), fish and wildlife habitat values would not be impacted because the areas being proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes and ephemeral washes) or human use (e.g., sand dunes, Garfield County Motocross, Kaneplex area, and topsoil pit). In these areas, continued disturbance of previously disturbed areas would not likely result in impacts.

Permitting commercial forest and woodland products harvest while meeting other resource objectives would maintain present habitat conditions. However, there could be short-term habitat loss or wildlife displacement from harvesting.

Surface disturbance associated with the development of locatable minerals and mineral materials would be the same as for Alternative A.

The effects of designing road crossings to support fish passage in areas that support fish would be the same as for Alternative B.

Displacement

Seasonal restrictions on surface disturbing activities would protect Greater sage-grouse and raptors during sensitive life stages. The lack of surface disturbing restrictions could greatly increase site-specific displacement and physiological stress to wildlife from human presence and activity during sensitive life stages compared to Alternative A. The possibility of increased human presence in SRMAs, concentrating around staging areas, trails, and other developed recreation sites, could displace wildlife species from habitat surrounding interpretive sites, depending on the location and level of human presence associated with the site. Increasing management presence in SRMAs (122,800 acres, 22%) would result in decreasing impacts from dispersed recreation activities compared to those described under Alternative A. More of the SRMAs would be managed for motorized uses, which could increase the displacement of wildlife by OHV use. Management of recreation by allowing dispersed camping would result in minor localized harassment of wildlife due to human presence and disruptive activities.

Displacement of wildlife during vegetation treatments would be the same as for Alternative B, except that focusing treatments for livestock purposes would reduce species composition in available forage bases. Generally, there would be fewer woody species, shrubs, and forbs, which would favor wildlife species that use a grass-dominant vegetation type.

Allowing cross-country OHV use (more than 1,100 acres) on 1,462 miles of designated routes in areas where OHV use is limited to designated routes (525,300 acres, 95%) would result in the displacement of wildlife through human presence and disruptive activities. In general, travel management activities that result in increased human presence would have a localized impact on fish and wildlife species. Impacts could include increased displacement of wildlife, increased stress during critical time periods, and degradation of habitats. OHV use can alter the seasonal use patterns of many wildlife species. Of particular concern are raptor nesting sites, big game parturition areas, and winter habitats. Areas closed to OHV use (27,600 acres, 5%) or away from designated routes where OHV use is limited to designated routes would avoid impacts associated with the disruption of wintering big game and preserve habitat characteristics. Seasonal restrictions on 2 miles of OHV routes in Pugh Canyon for raptor species would provide protection from disturbance and habitat degradation during the closure period from February 1 to August 31.

Impacts from closing raptor areas to rock climbing would be the same as described under Alternative B. Increasing the size of SRP groups to 20 people per group within wetland/riparian zones, WSAs, and designated critical habitat for special status species, and increasing the size of SRP groups to 40 people per group in the remainder of the decision area could increase disruptive activities compared to Alternatives B and C. This could increase the potential for displacement of wildlife.

Habitat Maintenance and/or Enhancement

Vegetation treatments that emphasize commodity production to increase forage and woodland products could favor grazing ungulates and other wildlife species that prefer grasses and forbs. In addition, emphasizing commodity production could reduce other habitat components.

General vegetation management of rehabilitation objectives, including managing for 51 percent or higher of PNC, managing hanging gardens and restoring sagebrush steppe communities and old-growth forest and woodland stands would be the same as described in Alternative B.

Alternative D would be more restrictive to surface disturbing activities than Alternative A. Areas that are closed to surface disturbing activities (19,700 acres, 4%), areas open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing (98,100 acres, 18%), areas withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 7 acres, <1%, respectively), areas closed to mineral material disposals (21,200 acres, 4%), ROW exclusion areas (75,200 acres, 14%), ROW avoidance areas (15,200 acres, 3%), and areas closed to OHV use (27,600 acres, 5%) would protect fish and wildlife habitat from surface disturbance and disruptive activities. These decisions include restrictions on the uses of fish and wildlife habitat, special status species habitat, SRMAs, WSAs, Wilderness, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would limit surface disturbance, maintain fish and wildlife habitat quality, and reduce or eliminate the effects of displacement from human presence. Areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) (64,600 acres, 12%) would include stipulations to minimize impacts from oil and gas exploration and development to sage-grouse and raptor habitats. Implementation of erosion control measures on 15% slopes would reduce erosion and surface runoff, which could enhance fish and wildlife habitat. Applying BMPs to avoid or reduce fragmenting habitat and mitigating habitat losses could reduce habitat fragmentation and losses for fish and wildlife. In addition, in-kind or out-of-kind mitigation would be considered in proximity to the impacted riparian habitats, which could reduce habitat fragmentation and losses for fish and wildlife. Allowing offsite and out-of-kind mitigation would mean that impacted habitats could remain disturbed, resulting in long-term localized habitat losses.

Impacts from closing and reclaiming roads, facilities, or improvements that are no longer necessary would be the same as described in Alternative B. Management actions for soil resources would be the same as for Alternative B, except that activities would be allowed in fragile soil areas, which could lead to habitat degradation due to developments and increased erosion. Impacts from water resources would be the same as described under Alternative B, except that managing the discharge of produced waters would be in a manner approved by the State. This could lead to potential degradation of water quality and fisheries.

Impacts from managing the plague and other diseases in Utah prairie dog colonies and protective measures for Mexican spotted owl PACs would be the same as described in Alternative B.

Impacts from management actions for desired future conditions and fish passage on road crossings would be the same as described under Alternative B.

Impacts from management of habitat to provide for wildlife management objectives and authorization of wildlife habitat improvement projects would be the same as described under Alternative B. However, allowing disposal of crucial wildlife habitat through Recreation and Public Purposes Act (R&PP) patents could lead to a loss of crucial winter range, which could result in population declines. Impacts from fish and wildlife translocation, transplantation, augmentation, and reestablishment would be the same as described under Alternative B.

Management of forage allocation by allocating 11,045 AUMs to wildlife and reallocating 40 AUMs on the Lower North Fork Allotment, and the Sawmill Allotment would provide an increased amount of forage for ungulates and other species in these allotments. Management to mitigate conflicts between grazing and other uses could provide a mechanism to ensure that habitat deterioration would not occur due to overuse by multiple uses.

Management of ROWs and ROW corridors for the siting and construction of communication towers to meet aircraft safety requirements could lead to the loss of raptors or migratory birds. Managing powerlines to reduce the risk of raptor electrocution or line-strike would reduce raptor injury and mortality. However, not requiring new and reconstructed powerlines to be buried could result in the electrocution or line strike of raptors.

Management of visual resources would be the same as for Alternative A, except that restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on approximately 14,200 acres more than for Alternative A.

Impacts from managing ACECs would be eliminated because no areas would be designated as ACECs under this alternative.

Not managing 5,600 acres of WSR corridors (28.6 miles) with wildlife ORVs could lead to impairment of these values. However, management associated with riparian areas and other management actions could provide protection of these values.

Summary

Habitat alteration, fragmentation, and/or loss occurs when habitat components needed for species survival (e.g., forage and cover) are removed or when contiguous habitat is broken up (fragmented) by surface disturbing activities. This results in a reduction in usable ranges and disruption of movements among habitats, transitional areas, and breeding areas (Harris 1991).

Displacing activities may not directly affect components, but they force animals to move into less desirable habitat, increasing competition for available resources with other species and uses. Users could introduce noise or dust that could disturb species during sensitive periods, which could indirectly affect reproduction or cause species to abandon areas such as nest sites or areas containing key habitat components such as important food sources. Stress inflicted on species could also deteriorate species health, which could affect survivability. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to poorer (lower) quality habitat.

Habitat maintenance and/or enhancements occur as a result of vegetation treatments to reduce soil loss, improve crucial big game habitat, restore ecological function, and increase forage production. Vegetation treatments would result in short-term reduction of habitat values (e.g., forage and shelter) until vegetation communities are reestablished. However, over the long term the treated areas would provide improved forage conditions and reduced erosion, which would enhance wildlife habitat and fisheries. Vegetation treatments would improve the diversity of vegetation age classes and lead to greater herbaceous vegetation production and forage quantity and quality, improving palatability for some wildlife species.

All of the alternatives restrict surface disturbing activities and disturbances that result in varying degrees of protection of fish and wildlife habitat. Alternative C would place the greatest restriction on these activities and, therefore, would provide the most protection to fish and wildlife habitat from alteration, fragmentation, and/or loss, and would reduce displacement and physiological stress to wildlife. In addition to restricting surface disturbing and disruptive activities, Alternative C would improve the

condition of vegetation and reduce erosion rates through potentially more acres of vegetation treatments, which would improve habitat conditions. Management actions that would protect fish and wildlife habitat from surface disturbing and disruptive activities include ACEC designations, mineral exploration and development closures, and OHV use closures. Over the long term, vegetation treatments would also maintain or enhance habitat characteristics. Conversely, Alternative A would place the fewest restrictions on surface disturbance and disruptive activities. Alternative A would have the most impacts on habitat alteration, fragmentation, and loss. The potential for wildlife displacement and physiological stress to wildlife would be greatest under Alternative A. In addition, Alternative A would provide for the least amount of habitat enhancements. Surface disturbing activities and disruptive activities, such as recreation, mineral exploration and development, OHV use, and vegetation treatments would be the most common sources of displacement. Alternative B would provide fewer protections than Alternative C, but would allow for similar levels of habitat enhancement. Alternative D would provide slightly more restrictions on surface disturbing and disruptive activities than Alternative A, but would allow for levels of habitat enhancement similar to those described in Alternative B.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Due to the limited extent of foreseeable development and the existing health of wildlife populations, there would be no irreversible or irretrievable impacts.

Management actions could result in various short-term impacts on habitat, such as increased localized soil erosion and vegetation damage. Surface disturbing activities could result in the greatest potential for impacts on long-term productivity. Existing health of wildlife population, limited extent of foreseeable development, management actions, and application of BMPs would minimize the effect of short-term uses.

Unavoidable damage to fish and wildlife from permitted activities could occur if resources undetected during surveys were identified during ground disturbing activities. Unavoidable loss of species due to lack of information, documentation, and inadvertent damage or use could also occur.

Surface disturbing activities could result in unavoidable adverse impacts, although these impacts could be mitigated to the extent possible. Permanent conversion of areas to other uses such as transportation and mineral and energy development would decrease the relative abundance of species within portions of plant communities, reducing habitat values in these areas. Oil and gas wells and their associated infrastructure would be mitigated to the extent possible to minimize fragmentation and avoid the most significant wildlife habitat values.

4.2.7 Impacts on Wildland Fire Ecology

This analysis addresses the potential impacts on fire ecology from implementing the management actions under the alternatives described in Chapter 2. Impacts on resources, resource uses, and designations resulting from implementation of the fire management program are discussed in the resource sections in this chapter. This analysis focuses on the management alternatives or actions that affect fire intensity, frequency, and suppression efforts.

Fire intensity could be affected by activities that decrease fuel loading, such as vegetation treatments and harvesting of forest and woodland products, and activities that alter the composition and structure of vegetation communities. High-intensity fires generally result in a greater loss of vegetation cover, changes to soil chemistry, damage to root structures, and a greater ability for non-native species to become established. Activities that could introduce ignition sources (e.g., recreation use and mineral exploration and development) would have the greatest effect on fire frequency. These additional ignition sources would increase the probability of wildland fire occurrence and increase the need for fire suppression activities. The ability to use certain fire suppression techniques could be affected by restrictions designed to protect sensitive resources from surface disturbing activities. Such restrictions are associated with the management of wilderness, WSAs, sensitive viewsheds, cultural and paleontological resources, and special status species.

The analysis is based on the following assumptions:

- Fire is an important functional, natural disturbance in many of the ecological systems found in the decision area.
- A direct relationship exists between the density of human use within the decision area and the frequency of human-caused fires.
- Fire size and intensity are more likely to increase as fuel loading increases.
- Wildland fire use would be expected to not require rehabilitation. If unintentional resource damage does occur, rehabilitation will be applied.
- Demand for fuels treatment will continue to increase over the life of the plan.
- ATVs and off-road motorcycles have a reduced potential for ignition sources because they have raised exhaust systems and spark arresters.
- Burned acres for wildfires would not exceed 87,100 acres for a 20-year cumulative maximum (BLM 2005c). If these acres are exceeded, it may require additional analysis.
- Wildland fire use would not exceed 390 acres for a 20-year cumulative maximum (BLM 2005c). If these acres are exceeded, it may require additional analysis.
- Prescribed fire acres would not exceed 103,000 acres for a 20-year cumulative maximum (BLM 2005c). If these acres are exceeded, it may require additional analysis.
- Non-fire fuels treatment acres would not exceed 117,500 acres for a 20-year cumulative maximum (BLM 2005c). If these acres are exceeded, it may require additional analysis.
- ESR acres would not exceed 87,100 acres for a 20-year cumulative maximum (BLM 2005c). If these acres are exceeded, it may require additional analysis.

In the absence of quantitative data, best professional judgment was used, and impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate. Under all alternatives, impacts on fire ecology would not be anticipated as a result of implementing management actions for other designations.

Impacts Common to All Alternatives

Fire Ecology Management

Activities associated with fire ecology management likely would have the greatest effect on the ability to control wildland fires. Using wildland fire and prescribed fire to protect, maintain, and enhance resources would reduce fuel loading and promote healthy, diverse vegetation communities, both of which would decrease the intensity of wildland fires and facilitate suppression efforts. Suppressing wildland fires in areas where fire is not desired (such as areas with high resource values, structures, cultural sites, and habitat for sensitive species) may in the short term reduce fire size and intensity in these areas and increase the ability to control fires and protect important resources from fire damage. This management action would also directly facilitate achievement of the goals of the fire program; however, implementing fire suppression would continue to limit and exclude fire from functioning in its natural role, resulting in further departure from the historic fire regime over the long term, and would indirectly result in a longer fire-return interval, the continued buildup of fuel loads, and the promotion of vegetation communities that would more likely fuel high-intensity fires. Fire-dependent plant communities could deteriorate over the long term if fire were prevented from occurring within these communities.

Management Actions that Affect Fuel Loads

Grazing by livestock and/or wildlife would reduce fire frequency by reducing fine fuels (e.g., grasses) that serve as ignition sources and allow low-intensity wildland fires to spread. Using livestock grazing to help accomplish resource objectives on allotments (e.g., hazardous fuel reduction) on a case-by-case basis would further reduce fuel loads. Although this could result in fewer fires in the decision area, decreasing the probability of ignition could also provide more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires, which could increase the intensity of wildland fires over the long term. Applying the *Standards for Rangeland Health* to all rangelands would prevent severe removal of fine fuels by surface uses, which would help maintain fine fuel cover and the occurrence of low-intensity fires. The standards would also promote healthy, diverse vegetation communities that generally fuel low-intensity fires.

Vegetation and weed treatments would decrease both standing and non-standing vegetation (fuel load) across the decision area, which would decrease the intensity of wildland fires, and allow fires to be more easily controlled. These activities would also modify the composition and structure of vegetation communities by creating mosaic vegetation patterns and natural fuel breaks, and by promoting healthy, diverse vegetation communities that generally fuel low-intensity fires. Specifically, efforts to reduce incursion of non-native annual grasses (primarily cheatgrass), encroachment of shrubby vegetation, buildup of biomass in forested areas, and spread of noxious and invasive weeds would help to achieve this effect. Habitat improvements for special status species and fish and wildlife could also have similar impacts. Treating vegetation to improve resource conditions would continue to reduce the occurrence of uncharacteristic wildland fire, damage and catastrophic suppression, and rehabilitation costs.

Management Actions that Affect Fire Suppression Activities

Maintaining air quality standards within thresholds established by the State of Utah could result in fewer prescribed fires or more suppression efforts on wildland fires. If it were determined that air quality or Class I airsheds would be adversely impacted, wildland fire use and prescribed fires would be suspended. Consideration of regional haze could increase the restrictions on wildland fire use or prescribed fire. These restrictions would lead to increased fuel loads.

Surface disturbance restrictions intended to protect natural values, including Wilderness, WSAs, WSRs, fish and wildlife, and special status species (e.g., prohibiting ground disturbing activities within ½ mile of bald eagle nests and Mexican spotted owl nests) could preclude certain types of fire suppression activities,

which would limit the ability to control fires and to protect these sensitive resources. Seasonal restrictions could preclude certain types of fire suppression activities within the restricted time frame. In addition, wilderness policy and the Interim Management Policy for Lands Under Wilderness Review (IMP) could affect fire suppression activities and equipment used in WSAs and in the Paria Canyon–Vermilion Cliffs Wilderness. This could affect fire suppression efforts and the ability to control large, intense wildland fires.

The presence of significant cultural and paleontological resources would require suppression of wildfires threatening the sites. Their presence also would limit and/or restrict certain types of fire suppression methods and fuels treatments. This could affect the ability of firefighters to protect cultural sites and surrounding areas during wildland fire suppression activities. The need for suppression actions during wildland fire events would be reduced for cultural sites that received hazardous fuels treatments. This impact would occur in small, localized areas where such resources are known to exist.

Management Actions that Affect Fire Frequency

Recreational activities in the decision area could affect fire management. The recreational opportunities in the decision area attract increasing numbers of visitors, which increases the probability of unintentional fire starts and the need for fire suppression activities. Both campfires and exhaust systems on motorized vehicles can cause unintentional ignitions. Developed campsites would act as safety zones and fuel breaks, but would also require additional protection in wildland fire events. Ignition would be less likely in developed campsites (fire rings, safety) because of fire restrictions. Because OHV use allows visitors to access remote areas, human-caused fires (e.g., due to unattended campfires and vehicle sparks) could occur in areas that are difficult to access with fire suppression equipment. The routes that provide motorized access to public lands within the decision area facilitate travel, and increase the distribution of visitors throughout the decision area, thus increasing the extent of related effects. OHV use allows visitors to access even the most remote areas of the decision area, which can make access difficult for fire suppression equipment in wildland fire events. However, the routes would also provide access for suppression efforts and natural fuel breaks. Developing more recreation sites and facilities would concentrate ignition sources to areas of high use. In these areas, the lack of fuels would be less likely to result in ignitions.

Activities associated with mineral exploration and development would increase human presence and the use of heavy equipment in the decision area, which would introduce additional ignition sources and increase the probability of wildland fire occurrence and the need for fire suppression activities. However, mineral development areas could also provide increased accessibility to remote areas for fire suppression equipment and provide fuel breaks in the case of wildland fire events.

Surface disturbance caused by development activities could modify the composition and structure of vegetation communities, including the spread of noxious weeds. These disturbed areas could be more likely to fuel high-intensity fires.

Alternative A

Management Actions that Affect Fuel Loads

Implementing vegetation treatments (e.g., mechanical, fire, biological, and chemical), managing vegetation resources to meet desired vegetation conditions, and conducting land treatments would generally decrease both standing and non-standing vegetation (fuel load) across the decision area, which would decrease the intensity of wildland fires and allow fires to be more easily controlled. Controlling the infestation and spread of noxious and invasive species would reduce the potential for losing key ecosystem components while reintroducing fire into fire regime Condition Class 2 and Class 3. Focusing

on use of native seeds in rehabilitation would provide for healthy fuel stands that are capable of recovering from fire events. However, in the short term, using less aggressive native seeds could result in the invasion of annual grasses (cheatgrass) due to lack of competition. This could change fire regimes to more frequent fires. Vegetation treatments under this alternative would not be conducted in areas containing ponderosa pine, which would continue to lead to increased fuel loads, which could lead to larger crown fires and increased potential for stand-replacing fires.

The harvesting of forest and woodland products would reduce fuel accumulations in wooded areas and subsequently reduce wildland fire intensity. This activity would reduce overall canopy density, which would inhibit the movement of fire through the canopy. Harvest of woodland products would reduce the fuel load and help reduce the encroachment of pinyon-juniper woodlands into the sagebrush steppe. However, this impact would be localized because the demand is limited. Individual treatment areas could act as firebreaks, changing wildland fire behavior in these areas. Not allowing the harvest of any ponderosa pines could result in increased stand density and increase the potential for stand-replacing fire.

Management Actions that Affect Fire Suppression Activities

Restricting surface disturbing activities could preclude certain types of fire suppression activities, which would limit the ability to control fires and to protect these sensitive resources. Management of fish and wildlife habitat, special status species, water resources, soil resources, visual resources, ACECs, and WSR corridors generally would include actions that restrict construction activities and other surface disturbances. Under this alternative, no surface disturbing actions would be allowed on 14,900 acres (3%), which would require that fire suppression activities in these areas be consistent with management restrictions.

Management that protects riparian/wetland habitats could impact fire suppression and fuels treatments, requiring suppression of wildland fires threatening these areas. Depending on the site, limitations and/or restrictions on certain types of fire suppression methods could be necessary. This could affect the ability of firefighters to protect the area during wildland fire suppression activities. These areas could receive hazardous fuels treatments to reduce the need for suppression actions during wildland fire events.

Restrictions associated with VRM Class I and II could limit fuels treatment and fire suppression techniques to be consistent with the resource protection measures based on VRM Classification. This could limit the ability to control fires in these areas. Under Alternative A, 21,200 acres (4%) would be managed as VRM Class I and 99,900 acres (18%) would be managed as VRM Class II.

Land use restrictions within WSR corridors, Wilderness, and WSAs could affect the types of fire suppression activities, which could affect the ability to control fires and to protect these sensitive resources. Under Alternative A, all 15 eligible river segment corridors (9,230 acres), Wilderness areas, and WSAs would be protected.

Aboveground ROWs and communication sites would require additional efforts by firefighters to protect these areas in wildland fire events. Underground ROWs would need to be avoided during suppression efforts such as the construction of fire lines. Development of ROWs would result in clearing vegetation to make way for linear features, such as roads, pipelines, and transmission lines. ROWs could provide fuel breaks, which could be effective in preventing the spread of wildland fires. Some ROWs could also provide firefighters with access routes to remote areas. Because no areas are closed to ROW development, these impacts could occur throughout the decision area where surface disturbance would be permitted. Areas closed to surface disturbance (e.g., WSAs and Wilderness) would not be affected in this manner.

Management Actions that Affect Fire Frequency

Recreation use would introduce additional ignition sources, such as campfires and exhaust systems on motorized vehicles, into the decision area, which could increase the probability of wildland fire occurrence. This would be more prevalent in areas with motorized recreation because of increased areas that would be accessible to more visitors. Managing 466,600 acres (84%) as open to cross-country OHV use and 66,200 acres (12%) as limited to 57 miles of existing and designated routes would maintain a risk for wildland fire occurrence. In these areas, cross-country travel across areas with high fuel loads would be allowed, which would increase the potential for wildland fire ignitions.

Minerals development activities would introduce additional ignition sources into the decision area, and consequently increase the probability of wildland fire occurrence. Related long-term disturbance of about 607 acres would result in degraded vegetation communities that could more likely fuel high-intensity fires; however, developed areas could provide increased accessibility to remote areas for fire suppression equipment, and provide fuel breaks in the case of wildland fire events.

Alternative B

Management Actions that Affect Fuel Loads

Conducting annual vegetation and land treatments (e.g., wildlife habitat treatments, watershed treatments, livestock rangeland treatments, fuels treatments, and stewardship contracting) on an annual average of no more than 22,300 acres (446,000 acres over the life of the plan) using the full range of vegetation treatment methods and tools (i.e., prescribed fire, mechanical, chemical, biological, woodland product removal, and wildland fire) would decrease fuel loading, which would decrease the intensity of wildland fires and allow fires to be more easily controlled. In addition, these activities would promote healthy, diverse vegetation communities, which generally burn with less intensity than modified and degraded vegetation communities. Impacts from implementing vegetation treatments would be the same as described in Alternative A, except that managing to achieve the 51 percent or higher of PNC could promote diverse vegetation communities that would burn with less intensity and be more easily controlled or could increase fire intensity.

Under Alternative B, treatments would be conducted in areas containing ponderosa pine for stand health, which would increase tree spacing, decrease fuel loading, and thereby decrease fire size/intensity. Fuels regimes would move toward Condition Class 1. Managing for old-growth forests and woodland stands would reduce the amount of dead and downed fuels attributed to insect, disease, and overgrowth. This would maintain old-growth stands, with sufficient surface cover and ladder fuels to ensure that wildland fires would be low-intensity, small, and easy to control. By managing for the desired condition these vegetation types would move toward fire regime Condition Class 1.

Impacts from the management and production of forest and woodland products would be the same as described in Alternative A. In addition, permitting harvest of forest and woodland products to promote or sustain forest health on a case-by-case basis would further reduce loads and improve forest health, and could move those areas harvested toward fire regime Condition Class 1.

Management Actions that Affect Fire Suppression Activities

Areas where surface disturbing actions would be precluded would increase compared to Alternative A to 19,700 acres (4%). This would increase the area where fire suppression activities could be limited or restricted.

Controlling surface disturbing and disruptive activities to minimize impacts on identified crucial habitat for sensitive species, applying BMPs to avoid or reduce habitat fragmentation, prohibiting surface

disturbing activities within ½ mile of active or suitable Utah prairie dog habitat, and applying seasonal restrictions in big game habitats could restrict certain types of fire suppression activities, which could limit the ability to control fires and to protect these sensitive resources.

VRM Class I areas would increase to 76,000 acres (14%) and VRM Class II areas would increase to 93,600 acres (17%) compared to Alternative A. This could limit mechanical land treatments, which could result in fuels buildup and increased risk of catastrophic wildfires in this area.

Seven eligible river segment corridors (6,310 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification. This would increase the area where fire suppression activities could be limited or restricted. Although management associated with the Cottonwood Canyon ACEC does not specifically address wildland fire management, fire suppression activities would have to consider its resources, which could affect some of the suppression tactics available.

The full range of suppression activities are available within Wilderness areas and WSAs, although the suppression methods that result in the least long-term disturbance (i.e., use minimum tool standard in the Wilderness area and nonimpairment criteria for WSAs) while protecting human life and property would be preferred. Wilderness and WSA management would allow the use of chemical, biological, or mechanical treatments, which would help restore ecological functions. These areas would move toward fire regime Condition Class 1 as a result of the various forms of treatment.

The magnitude of impacts from ROWs would decrease compared to Alternative A because 75,700 acres (less than 14%) would be excluded from new ROWs. In addition, new ROWs would be avoided in more than 14 percent (78,900 acres) of the decision area. This could reduce the areas where ROWs would need to be protected. However, it would also reduce the fuel breaks and access routes associated with the ROWs.

Management Actions that Affect Fire Frequency

Additional restrictions on OHV use would decrease the potential for wildland fire occurrence. Decreasing the areas open to cross-country OHV use to 1,100 acres (<1%) and increasing the area limited to 1,387 miles of designated routes on 524,000 acres (95%) would decrease the potential for wildland fire occurrence because less area would be easily accessible to visitors.

Impacts from the additional ignition sources and permanent removal of vegetation communities associated with leasable, salable, or locatable minerals development would be the same as described in Alternative A.

Alternative C

Management Actions that Affect Fuel Loads

Implementing an annual average of at least 4,650 acres (93,000 acres over the life of the plan) of vegetation treatments, not to exceed an annual average of 22,300 acres (446,000 over the life of the plan), would ensure progress toward fire regime Condition Class 1. However, using treatment methods that mimic natural processes (e.g., prescribed fire, biological, and hand cutting) would result in a short-term increase in the potential for larger, more intense wildland fires such as wildland fires that occur in Condition Classes 2 and 3. To maintain other resource goals and objectives, significant resources would be used to suppress these fires. The potential size and intensity of the wildland fires would increase the potential threats to life and property and the potential to lose key ecosystem components.

Precluding commercial forest and woodland products harvest, including in WC areas, could lead to higher fuel loads. Implementing vegetation treatments would minimize the extent of these effects. Impacts from commercial woodland harvest would be the same as described in Alternative A; however, impacts could occur over a smaller area.

Management Actions that Affect Fire Suppression Activities

Increasing the area of no surface disturbing actions to 32,700 acres (6%) would increase the area where fire suppression activities would be restricted compared to Alternative A. Additional measures to protect special status species would increase impacts on fire suppression activities. Surface disturbing and disruptive activities on identified crucial habitat would be prohibited, and surface disturbing activities would be prohibited within ¼ mile of habitat suitable for Western yellow-billed cuckoo and Southwestern willow flycatcher. These additional measures could restrict certain types of fire suppression activities, which could limit the ability to control fires and to protect these sensitive resources.

Impacts from management of visual resources would increase compared to Alternative A. VRM Class I areas would increase to 168,300 acres (30%) and VRM Class II areas would increase to 100,000 acres (18%). This could limit mechanical land treatments, which could result in fuels buildup and increased risk of catastrophic wildfires in this area.

Impacts from managing WSR corridors would be similar to those described under Alternative A because all 15 eligible river segment corridors (9,230 acres) would be determined suitable and would be managed to protect their ORVs, free-flowing nature, and tentative classification. However, land use allocations in Alternative C would be consistent with protective management, reducing some potential for ignition sources but also affecting the suppression tactics available for use. Although management associated with the five ACECs does not specifically address wildland fire management, fire suppression activities would have to consider their resources in fire events, which could affect the suppression tactics available.

Impacts from management of Wilderness and WSAs on fire suppression activities would increase compared to Alternative A due to relying only on fire-related fuels treatments in Wilderness. This would require application at times when the treatment would not adversely impact the area to be treated, limiting treatment windows and, by association, acreage. Although ecological function would be restored and fire would be re-introduced in Alternative C, fire regimes would move toward Condition Class 1 more slowly than in Alternatives A and B.

Additional restrictions on ROWs would decrease impacts on fire suppression activities compared to Alternative A. Although approximately 295,400 acres (53%) would be available for ROW development and subject to the impacts noted in Alternative A, the remainder of the decision area would be either excluded from or avoid ROW development. This would reduce the need to avoid new ROWs during suppression activities, but it would also reduce the potential for ROW-related fuel breaks and access routes in these areas.

Management Actions that Affect Fire Frequency

Management actions that restrict cross-country OHV use would reduce the potential for wildland fire occurrence. No areas would be open to cross-country OHV use and 388,300 acres (70%) would be limited to 1,190 miles of designated routes or seasonally limited routes. This would decrease the potential for wildland fire occurrence because less area would be easily accessible to visitors.

Impacts from the additional ignition sources and permanent removal of vegetation communities associated with leasable, salable, or locatable minerals development would be the same as described in Alternative A.

Alternative D

Management Actions that Affect Fuel Loads

The impacts from implementing vegetation and land treatments would be the same as described in Alternative B.

Impacts from managing commercial timber and woodland harvest would be the same as described in Alternative A; however, harvest could occur over a larger area.

Management Actions that Affect Fire Suppression Activities

Additional restrictions on surface disturbing activities would increase the area where fire suppression activities could be restricted compared to Alternative A. No surface disturbing actions would be allowed on 19,700 acres (4%), which would increase the area where fire suppression activities would be restricted compared to Alternative A.

Impacts from management of special status species would be the same as described in Alternative B.

VRM Class I areas would increase to 75,400 acres (14%) and VRM Class II areas would increase to 59,900 acres (11%). This could increase limitations on mechanical land treatments compared to Alternative A, which could result in fuels buildup and increased risk of catastrophic wildfires.

Because no WSR corridors would be determined suitable and no ACECs would be designated, wildland fire suppression tactics could be implemented across the landscape to best protect life, property, and high value resources. This could improve the ability to quickly control wildfires.

Impacts from management of Wilderness areas and WSAs would be the same as described in Alternative B.

Additional areas would be available for ROW development, which would increase the magnitude of impacts described in Alternative A. The area available for ROW development would increase to 463,600 acres (84%).

Management Actions that Affect Fire Frequency

Management actions that restrict OHV use would decrease the potential for wildland fire. Approximately 1,100 acres (< 1%) would be open to cross-country OHV use and 525,300 acres (95%) would be limited to 1,464 miles of designated routes. This would decrease the potential for wildland fire occurrence because less area would be easily accessible to visitors compared to Alternative A.

Impacts from the additional ignition sources and permanent removal of vegetation communities associated with leasable, salable, or locatable minerals development would be the same as described in Alternative A.

Summary

Vegetation treatment and forest and woodland product harvest under Alternatives B and D would reduce fuel loading and the intensity of wildfire. Alternatives A and C would also provide vegetation treatments that would reduce fuel and subsequently reduce wildland fire intensity. However, Alternative C would use treatments that mimic natural processes and preclude commercial forest and woodland product harvest, which could lead to higher fuel loads, larger, more intense wildland fires, and increased wildfire suppression costs. Under Alternative A, treatments would not occur in ponderosa pine forests, which

would lead to increased understory and fuel loads, which in turn could lead to larger crown fires and associated loss of ponderosa pine stands. Alternative A would have the most allocations for surface uses and disturbances with the least amount of areas with restrictions, which allows for fire suppression activities and the ability to control fires. Alternative C would have the least amount of area allocated for surface disturbing activities and the most area that limits or restricts such activity, which could result in fuels buildup and increased risk of catastrophic wildfires.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources. There are no short-term uses proposed that would affect the long-term productivity of wildland fire ecology because of the application of identified resource protection measures. Recreational activities, development of mineral resources, and general use of the decision area will continue to increase, introducing additional ignition sources and increasing the potential for wildland fires. Wildland fires from these ignition sources are not desired, and would increase the need for suppression activities.

4.2.8 Impacts on Cultural Resources

The primary cultural resource impact is the disturbance of artifacts, sites, and features of sites that reduces their scientific integrity, alters their association with traditional values, reduces their public use values, and reduces the potential to provide significant data. This can occur from activities or processes that disturb the surface, remove vegetation, increase soil erosion, or otherwise lead to cultural artifacts being damaged or moved from their original positions (in situ) prior to scientific documentation. Cultural resource information and values can also be damaged or lost if the soil matrix at a site is lost or removed without the potential for scientific study. Although deterioration of cultural sites and their artifacts may be slowed or halted, physical damage to objects and sites cannot typically be reversed. Cultural values can also be affected if the physical setting associated with a site is altered in a way that changes the relationship between the site and its physical surroundings. Short-term impacts on these cultural resource values from visual or auditory disturbance generally affect public or traditional uses of cultural sites or areas. These impacts can diminish the site's traditional use values, but can often be ameliorated or accommodated through activity planning.

To preserve cultural resource values as a part of our national heritage, various laws, regulations, and policies require that cultural resources be considered in any agency decision that could affect cultural resources. Consideration usually includes inventory, evaluation, and mitigation of effects. Addressing effects to cultural sites includes either project relocation or redesign (avoidance), or scientific data recovery methods such as recordation, surface collection, subsurface testing, and excavation.

Although information on locations of all cultural sites in the decision area is incomplete, the analysis considers the management alternatives and their potential to directly or indirectly affect cultural resources, as noted above. The number of sites that could be affected by various actions is directly correlated with the degree, nature, and quantity of surface disturbing activities in the decision area and whether the activity occurs in an area of high or low site density. Impacts are quantified where possible. In the absence of quantitative data, best professional judgment was used. Some of the decisions in this document are programmatic; others may be implemented immediately (e.g., route designation or oil and gas leasing stipulations). To ensure preservation of specific cultural resource sites, further analyses will be required at the implementation level following site-specific cultural resource inventories.

The analysis is based on the following assumptions:

- Cultural resources would continue to be discovered throughout the decision area.
- As access to an area increases, incidental damage of cultural resources adjacent to the access routes would increase. Impacts from incidental damage would be reduced as distance from the access route increases.
- The demand for use of cultural resources (e.g., public use, scientific use, and traditional use) will increase as access to and use of the planning area increases.
- The number of sites that could be impacted by various actions would be directly correlated with the degree, nature, and quantity of surface disturbing activities within the decision area and whether the activity occurs in an area of high or low site density.

Under all alternatives, impacts on cultural resources are not anticipated as a result of implementing management actions for the following resources and designations: air quality and other designations.

Impacts Common to All Alternatives

Cultural Resource Management Actions

Cultural resources would be managed in compliance with laws, regulations, and bureau policy, addressing their management when a site is identified during inventory associated with a surface disturbing activity. Each alternative would comply with federal laws and agency guidelines governing the identification, evaluation, and protection of cultural resources and Native American sacred/traditional sites. Cultural resources would continue to be identified, evaluated, and considered in association with all federal undertakings. Impacts on known cultural resource sites from surface disturbing actions would be mitigated. Impact mitigation, such as the scientific excavation of identified sites, would minimize the potential for adverse effects to known cultural resource sites.

Updating the Class I cultural resource inventory every 10 years would provide the landscape-level understanding of the cultural resources in the decision area. This would ensure that mandatory inventories, proactive inventories, and research designs would build on the cultural resource inventories and studies already completed. Associated with using proactive research, protection, and inventories involving universities, avocational and service groups, site stewards, tribes, and community outreach, the knowledge of, information about, and protection and preservation of cultural resources and the associated information they contain would be increased.

Providing interpretive opportunities could provide more cultural resource sites for public use and education. This action would require inventories to recover scientifically important data prior to allowing public use of the sites. Increased interpretation opportunities would increase public appreciation for the decision area's cultural values. Increased emotional linkages associated with appreciation could lead to increased user stewardship behavior (Sharpe and Ewert 2000). Major impacts associated with stewardship behavior include increased protection of cultural sites, decreased inadvertent damage to or disturbance of cultural sites, decreased vandalism and looting, and preservation of the integrity of cultural resources.

Mineral Development

Mineral development as a result of implementing the mineral decisions would involve direct and indirect impacts on cultural resources. Direct impacts are related to the level of surface disturbance assumed under the RFD scenario. Because the actual placement of each mineral development or associated feature is unknown at this level of planning, impacts on cultural resources are noted as potential impacts. Impacts also vary based on the type of mineral decision and areas available for development of the various minerals.

Because approval of mineral material sites is a discretionary decision, the inventories at the implementation level prior to development of approximately 650 acres (Appendix I) likely would identify between 3 (low site density) and 70 (high site density) cultural sites. In addition, inventories prior to the development of locatable minerals on approximately 400 acres (Appendix I) likely would identify between 2 (low site density) and 44 (high site density) cultural sites. These sites would be either avoided or mitigated through other means identified in the Section 106 consultation process.

Although more of the decision area is available for further coal leasing consideration, the RFD anticipates one surface mine would be developed in the Alton area, disturbing approximately 3,600 acres over the life of the plan (Appendix I). Although the exact placement of the mine is not a proposed decision in this document, based on the density of cultural sites within the Alton area, disturbance of this many acres would result in the identification of approximately 100 sites. Because the surface coal mine would result in the complete disturbance of surface resources, these sites would not be able to be avoided, resulting in mitigation through data recovery for many of these sites. This would increase the knowledge of the

cultural resources in the area, but it would also eliminate these sites from future study and uses (e.g., public, traditional, and scientific). However, because of the large number of sites, it may not be feasible to mitigate all of the sites through data recovery. As a result, some National Register–eligible sites could be lost without any data recovery. Development of a scientific research design prior to development of the coal mine would result in mitigation of the sites with the greatest potential for data recovery and information, limiting the extent of this impact to the degree possible.

Potential long-term impacts on cultural resources from mineral development include the identification of cultural resources during inventories preceding development activities. Identification of sites would increase the knowledge of the cultural resources in the areas. Most sites identified during these inventories would be avoided because of project relocation or redesign, which would protect the cultural resource site. When it is not possible to avoid sites, the archaeological sites would be physically altered or eliminated during mitigation activities, such as data recovery or other onsite means, as determined through the Section 106 process. Although the physical site could be altered or eliminated, excavation would preserve the artifacts and information associated with the site, maintaining the cultural values. During implementation of mineral development activities, there is also a potential for inadvertent damage to sites not identified during the inventories.

Although cultural sites within the area of mineral development will have been identified and either avoided or mitigated as part of the specific mineral development projects, sites not located within the footprints of undertakings are also vulnerable to impacts because human traffic in the general area increases. Potential indirect effects on cultural resources include increased erosion on cultural resource sites located in the vicinity of mineral developments where vegetation cover has been reduced or eliminated, and the potential for inadvertent impacts associated with increased human activities in these areas.

Opening areas for oil and gas leasing is an immediately implementable decision; areas open for leasing could be nominated for leasing by industry or offered for leasing by the BLM. On leasing these areas, the leaseholder is granted certain rights. Because the number of acres available for leasing varies by alternative, the potential for cultural resource impact varies. Therefore, there are no impacts common to all alternatives for oil and gas leasing.

Other impacts from mineral exploration and development include short-term disruption from visual or auditory effects such as drilling and automobile traffic. These impacts usually affect cultural landscapes or traditional uses and would be mitigated or accommodated through measures identified in the Section 106 consultation process.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Surface disturbing activities (e.g., mineral development activities, construction within ROWs, recreation site development, and construction of range improvements) could result in significant impacts on cultural resources in the absence of mitigation; however, these impacts would be mitigated through implementation of existing laws and policy, such as Section 106 of the National Historic Preservation Act (NHPA) and FLPMA. Cultural values would be protected (i.e., data recovery or preserved in place) through compliance with these laws, regulations, and policies. Federal undertakings typically require cultural resource inventories that would result in the identification of cultural resource sites and determination of eligibility for the National Register of Historic Places (NRHP). The cultural resources data acquired through inventories and evaluations would increase knowledge of cultural resources in the region. Following site identification from site-specific inventories, mitigation measures would be prescribed as necessary for eligible properties. Using this process, significant impacts on cultural resources eligible for the NRHP would be avoided or mitigated. Avoidance is the BLM's preferred measure to eliminate potential adverse effects to cultural resources. Avoidance preserves the cultural

resource in place. If this is not possible under reasonable circumstances, data recovery is an alternative mitigation method. Data recovery preserves as much of the cultural record as possible through archaeological methods, documenting cultural resources by making archival records associated with collected artifacts. Although data recovery preserves as much data as possible, the property or the site is still lost or damaged. Most data recovery methods eliminate a site's features through excavation. Removing cultural resources from a site using current scientific methods also reduces future scientific value if more accurate methods of analysis are developed. Mitigation through data recovery also reduces or eliminates other uses of cultural resources sites, such as traditional, public, conservation, or experimental use. Standard inventory and avoidance procedures conducted in conjunction with surface disturbing actions would protect most cultural resources from significant impacts.

Despite the best efforts of the BLM to identify all eligible resources, there remains a potential for inadvertent impacts on previously undiscovered sites, especially buried sites with no surface indications. There is a set process, through Section 106, for identifying, evaluating, and treating the effects of inadvertent discoveries, reducing potential impacts from these discoveries.

Management that Restricts Surface Disturbing Activities

Management decisions that restrict surface disturbance in an area, such as controlling erosion in frail watersheds, implementing BMPs, and limiting disturbance in special status species habitat, would preserve cultural resources in place. Prohibiting or restricting surface disturbing activities or excluding areas from surface disturbance would result in fewer Section 106 inventories, thus reducing the potential for incidental damage and the potential for site identification and recordation through data recovery associated with development. Controlling erosion in frail watersheds would ensure disturbance does not result in increased soil erosion in these areas. Erosion control measures would protect cultural resources in these areas from degradation associated with erosion above natural rates.

Livestock Grazing

Implementing *Standards for Rangeland Health* would contribute to maintained or improved range conditions and soil and vegetation stability. This would reduce the potential for new or continued impacts on cultural resources from erosion and vegetation-related impacts related to livestock grazing. In addition, using livestock grazing to enhance ecosystem health could improve vegetation structure and maintain natural disturbance regimes (e.g., removing cheatgrass). Although there could be short-term impacts from livestock congregation and trampling cultural sites, over the long term improved ecosystem health would help treated areas avoid increased fire frequency, protecting cultural sites from impacts from fire. Site-specific cultural reviews prior to implementation of such grazing use would eliminate the potential for unmitigated damage from livestock congregation.

Recreation Use

Limiting rock climbing within 300 feet of cultural sites would protect cultural resource sites from inadvertent human disturbance.

Wildland Fire

Wildfire, wildfire suppression efforts (including ESR actions), wildland fire use, and prescribed fire could impact cultural resource sites throughout the decision area, including the eligibility characteristics of sites that are listed or eligible for listing on the NRHP. Because not all cultural resource sites are known, the potential for impacts on cultural resources exists where wildland fire occurs within the decision area.

Impacts from wildland fire vary, depending on the temperature and duration of exposure to heat. Generally, higher temperatures and/or longer duration of exposure to heat increase the potential for damage to cultural resources. Prehistoric and historic resources potentially affected by wildfire may be

inorganic (e.g., lithic/rock, ceramics, cans, glass, and rock art) or organic (e.g., basketry, wooden structures, and dendroglyphs). Generally, organic materials are more at risk because they tend to burn or to be altered at lower temperatures than inorganic items. Wildfire impacts on inorganic cultural resources include fracturing, shattering, and changes in color and internal luster, which might reduce an artifact's ability to render information about the past. Hotter temperatures and longer exposure to fire are more likely to affect lithic materials. When these materials are likely to be present, it may be necessary to take protective measures. Wooden substructures, common in adobe structures, could be destroyed, possibly compromising the structure as a whole if exposed to fire. Historic earthworks such as trails, roads, irrigation ditches, and canals are less sensitive to fire. Wildfire could also impact rock art. Although there are no specific temperature guidelines for rock art, fire effects include soot smudging and discoloration from smoke, which obscure the rock art images; degradation of the rock surface from spalling, exfoliation, and increased weathering; changes in organic paints due to heat; and damage to rock varnish, which may destroy the potential to date the art (Tratebas 2004, Kelly and McCarthy 2001). Wildfire could also affect the dating potential of cultural data from both organic and inorganic material (Deal n.d., Buenger 2003, Loyd et al. 2002, Shackley et al. 2002, Solomon 2002).

As a general rule, fire would not affect buried cultural materials. Studies show that even a few centimeters of soil cover (4 inches) are sufficient to protect cultural materials (Oster n.d.). Wildfires that burn hot and fast through a site may have less of an effect on certain types of cultural materials than fires that smolder in the duff or burn for a long time period, allowing heat from the fire to penetrate the surface. In addition, heat from wildland fires could change the physical nature of the ground, making it harder to identify cultural resources.

The temporary reduction in vegetation cover following wildland fires would enhance surface visibility in the short term, which could allow otherwise-undetected cultural materials to be identified and recorded. Increased visibility could also increase incidental damage to cultural resources from public land users in the area before the vegetation provides surface cover. Loss of vegetation cover could also lead to a loss of cultural data through increased damage from increased soil erosion and alteration of soil characteristics, changes in drainage patterns, and flooding after a fire.

Often, cultural resources are more at risk of impact due to fire suppression activities than from wildland fire. Suppression efforts, such as fire line construction (hand and bulldozer lines) and the establishment of helicopter bases, safety zones, and fire camps, could disturb the surface and potentially destroy artifacts and the integrity of cultural resource sites. Water, foam detergents, and fire retardants could damage artifacts and features by causing swelling and then contraction. Other potential impacts from the use of retardants would include rapid cooling and subsequent damage (e.g., breakage, spalling, corrosion, staining, and rusting) to archaeological materials. Discoloration or warping of metallic surfaces could also occur. Rock art is particularly sensitive to damage from retardants. Impacts from wildland fire would be limited to less than 190,490 acres (34%), which would include less than 87,100 acres of wildfire, less than 390 acres of wildland fire use, and less than 103,000 acres of prescribed fire fuel treatments. Mitigation of these impacts would be provided through adherence to resource protection measures. Consultation with a cultural resource specialist during suppression activities in areas containing sensitive cultural resources would help to minimize impacts.

Following suppression, ESR actions on less than 87,100 acres (16%) are subject to the requirements of Section 106 of the NHPA, as amended (36 CFR 800, consultation with the Utah State Historic Preservation Officer). The areas that would be subjected to surface disturbance are subject to Class III cultural resource inventory. Inventories would result in the identification of cultural sites and lower the potential for impacts on cultural resources. Many areas used traditionally for hunting would be expected to be revegetated following a wildfire event. For localities where food or medicinal or raw material plants are gathered, the threat of invasive species occupying those areas may be an issue.

Wildland fires and prescribed fires typically burn at a lower temperature and duration than large wildfire events, which means that potential impacts would be less severe than those of unmanaged wildland fire. Prescribed fire events are occasionally preceded by non-fire fuels reduction actions to obtain a smaller, more manageable, and less intense planned burn. The relatively small acreages available for wildland fire use, relative to other possible fire management actions, would minimize the potential for impacts from such use. The potential impacts from these methods would typically have less long-term impact than from an unmanaged wildland fire event. Although loss of or damage to cultural resources during all planned fuel treatments is possible, proper planning and consultation with a cultural resource specialist would reduce these impacts to a negligible level. Over the long term, managing areas to restore fire regimes would result in less intense wildland fires and greater protection of susceptible or sensitive cultural resources.

Management to decrease current fuel loads could result in short-term increases in acres burned, but it would also decrease the number of large severe fires over the long term, which would, in turn, result in a decrease in the level of suppression required on an average wildland fire. A decrease in impacts on cultural resources from ground disturbing and other suppression activities would be realized over the long term. Heat- and duration-related impacts would be similarly reduced over time. In addition, as the long-term fire regime condition class approaches more natural conditions that would not support undesirable fires, non-fire fuel treatments could be phased out as a prescribed fire pretreatment, reducing the potential impacts on sites.

Non-Fire Vegetation Treatments

Maintaining healthy vegetation communities through vegetation treatments would reduce damage to cultural resources associated with catastrophic wildland fires and maintain soil resources, preserving cultural sites from deterioration above natural rates.

Non-fire vegetation treatments and other planned actions with the potential to affect cultural resources are subject to the requirements of Section 106 of NHPA, as amended (36 CFR 800, consultation with the Utah State Historic Preservation Officer). Areas affected by surface disturbance would be subject to a cultural resource inventory. Inventories would result in the identification of more cultural sites and lower the potential for impacts on cultural resources. Under all alternatives, cultural impacts from non-fire fuel treatments could occur on less than 117,500 acres (21%).

Non-fire vegetation treatments could directly impact cultural resources, depending on their location and type. Mechanical treatments (e.g., brush crunching and Dixie harrow) are more likely to impact cultural resources than are low-intensity treatments such as chemical treatments or hand lop-and-scatter. Some types of historic properties, such as historic mining-related features, could benefit from implementation of hazardous fuel reduction projects that would lessen the potential for severe, high-intensity wildland fires that could damage or destroy fire-susceptible sites. Vegetation treatments would also decrease pinyon-juniper encroachment, resulting in long-term improvement of vegetation conditions, which would decrease soil erosion, thus enhancing cultural resource stability.

Non-fire vegetation treatments involving surface and shallow subsurface disturbance could introduce organic materials to lower soil layers, contaminating shallow subsurface cultural resource sites containing early historic or prehistoric datable organics, such as charcoal, wood, or preserved plant materials. Plant and pollen contamination would lead to incorrect or inaccurate analytical results by researchers studying such remains preserved at sites. Surface and shallow subsurface effects could also include horizontal and vertical displacement of the upper portion of soils in which cultural resources are contained, compromising depositional context and integrity and causing artifact damage or destruction.

Other Management Actions

Cultural resources (particularly archaeological sites and historic ranches) are often located adjacent to water resources and/or riparian/wetland areas. Managing riparian/wetland areas in proper functioning condition (PFC) would reduce stream bank erosion from localized flooding events and other soil disturbing actions, which would preserve cultural resources in place in or directly adjacent to riparian areas.

Potential impacts from commercial live plant and seed collecting would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest, an increased potential would exist for identifying cultural resource sites. Mitigation for impacts would usually be avoidance.

Cultural resource inventories and evaluations would be required before transferring lands from federal jurisdiction, ensuring that cultural resource sites are inventoried, documented, and mitigated before ownership changes. The BLM may retain or obtain lands containing important cultural and historic resources, providing protection under federal management policies.

Cultural inventories and clearances prior to paleontological data recovery projects could identify cultural sites. In addition, paleontological resource assessments and inventories could result in the identification of cultural sites.

Management in the *Paria Canyon–Vermilion Cliffs Wilderness Plan* and IMPs (in WSAs) should provide long-term protection of cultural resources.

Alternative A

Cultural Resource Management Actions

Due to the lack of site allocations, management of cultural resources (e.g., long-term avoidance, development for public use, scientific use, and traditional use) would be determined as they are identified during inventories prior to surface disturbing activities. Sites not eligible for the National Register would receive no management, regardless of their other potential uses.

Impacts on cultural landscapes eligible for the National Register could be considered through adherence to federal regulations. This could protect the cultural characteristics of the landscapes; however, activities could be permitted that could result in visual intrusions in these landscapes.

Cultural resource inventories largely would continue in association with federal undertakings through most of the decision area. In these areas, sites would continue to be identified, but in a piecemeal fashion. In portions of the decision area (in the areas managed by the CBGA RMP and *Paria Management Framework Plan* [MFP]), specific inventories would identify more sites, increasing the understanding of the cultural resources in these areas.

Coordination with Native American Tribes to identify and manage traditional cultural properties could result in the identification of traditional cultural properties. If traditional cultural properties were identified, management of these resources could result in preservation of these resources. These cultural resource sites generally would be preserved in place.

OHV Access and Use (Cross-Country Use and Use on Designated Routes)

Allowing cross-country OHV use on 466,600 acres (84%) generally could impact surface features, break artifacts, and otherwise disturb cultural resources at the surface. It could also result in the pioneering of

new routes, increasing motorized access throughout these acres and increasing incidental damage to cultural sites. Unlike other permitted uses, cultural resource inventories and mitigation strategies would not be implemented before designating these large areas open to cross-country OHV use. Mitigation of cultural resource impacts would be implemented on a case-by-case basis after the impact has occurred. Mitigation would occur only in situations where impacted properties retain qualities that make them eligible for inclusion in the National Register.

Impacts from OHV use on 66,200 acres (12%) would be limited to cultural sites adjacent to 57 miles of designated routes (4% of inventoried routes). In these few areas, impacts from vehicle use off the route would be eliminated, but sites adjacent to routes could be damaged. Inadvertent damage to cultural resource sites is concentrated mainly within several hundred yards of roads because of increased accessibility (Sullivan et al. 2002). As distance from designated routes increases, the potential for impacts on cultural resources decreases. In the 12 percent of the decision area where OHV use is limited to designated routes, impacts on cultural resources would be minimal, if any. Designating existing routes that already receive OHV use as open for continued use would not, by the act of designation, result in increased impacts. Because the designated routes currently exist and receive use, additional impacts on and/or adjacent to them would be minimal. These impacts would also occur on the remainder of the 1,442 miles of inventoried routes that are not designated. Limiting OHV use to existing routes in areas with fragile soils would eliminate impacts from cross-country OHV use and not increase erosion above natural rates in these areas. This would maintain existing levels of natural deterioration to cultural sites. Because of closure to OHV use, there would be no impacts from OHV use within the Paria Canyon–Vermilion Cliffs Wilderness (21,200 acres, 4%) or in areas away from the designated routes in areas where OHV use is limited to designated routes.

Oil and Gas Leasing and Development

Cultural resource values on 473,400 acres (86%) open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) could be impacted by oil and gas leasing. Although cultural site densities vary in different areas throughout the decision area (Chapter 3, Section 3.2.9, Cultural Resources), site densities are low enough to provide for the identification and avoidance of cultural sites when leasees exercise initial development rights associated with oil and gas leases. Based on the RFD, oil and gas development within these areas could impact 2,070 acres over the life of this plan (Appendix I). Development on these acres would typically be subject to Class III cultural resource inventories and evaluation on a project-by-project basis prior to allowing disturbance. This likely would result in the identification of between 10 (low site density) and 226 (high site density) cultural sites in these areas. Site densities throughout the decision area generally would result in the identification and avoidance of cultural sites during development. However, development in areas of very high cultural site density could result in the identification of sites that are unavoidable to mineral development, and these sites would be physically altered or eliminated during mitigation activities such as data recovery or other onsite means, as determined through the Section 106 process. Although the physical site could be altered or eliminated, excavation would preserve the artifacts and information associated with the site, maintaining the cultural values.

Managing 478,900 acres (86%) as open to oil and gas leasing (i.e., open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints [timing limitation, CSU], and open to oil and gas leasing subject to major constraints [NSO]) could result in 906 acres of surface disturbance from seismic operations supporting oil and gas leases. This likely would result in the identification of between 4 (low site density) and 99 (high site density) cultural sites in these areas. On identification, seismic operations likely would be able to avoid all the identified sites.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (3%, 14,900 acres) would protect cultural resources from such activities. Such decisions include restrictions on uses of fish and wildlife and special status species habitat. The reduction or elimination of development in these areas would result in fewer Section 106 inventories, reducing the potential for site identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make cultural resource studies more difficult. However, inventories associated with other activities (e.g., vegetation treatments for soils, watersheds, habitat, livestock grazing, and fuels reduction) could still result in the identification of cultural sites, as noted in the impacts from those decisions throughout this analysis.

Cultural resources on 80,600 acres (14%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be preserved in place from oil and gas development. There would be a reduction in the potential for site identification and recordation associated with oil and gas development, compared with areas open to oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, cultural resources in areas withdrawn from minerals entry (4%, 24,591 acres) would also be protected in place from extraction of those minerals.

Recreation Use

Development of recreation sites would increase the potential for the identification of cultural resources during inventories before development. In addition, providing developed recreation sites in a few areas of high recreation use could reduce the potential for unmitigated impacts from dispersed recreation by concentrating recreationists in developed sites that have undergone Section 106 consultation and associated inventories. Also, education and interpretation media could educate visitors about cultural resource protection in these developed areas. However, there would be a potential for significant cultural resource impacts at non-developed recreation sites. Although use would be dispersed over a larger area, reducing the magnitude of impact, non-developed recreation sites usually do not have cultural resource inventories and clearances before being established. Impacts from non-developed recreation would be mitigated on a case-by-case basis when discovered. Cultural sites adjacent to developed recreation sites could be impacted due to inadvertent damage from uninformed or unaware recreationists. The use of signs, trails, and facilities would reduce inadvertent damage to cultural resources. Limited management at popular dispersed use areas would continue to result in concentrated recreation use, which could increase the potential for inadvertent damage of cultural sites.

Providing heritage tourism opportunities at the Civilian Conservation Corps developments at Pine Springs and two other cultural sites could provide cultural resource sites for public use and education. This would require inventories to recover scientifically important data prior to allowing public use of the sites. Increased interpretation opportunities also would increase public appreciation for the decision area's cultural values.

Livestock Grazing

The dispersed nature of livestock grazing generally results in livestock on an allotment being scattered in very small groups of 2-5 animals over large areas. However, in areas where livestock tend to congregate and/or trail, that disturbance could be concentrated in small, localized areas. In these small, localized areas, cultural resource sites could possibly be impacted by short-term removal of protective vegetation cover and increased soil compaction. These types of impacts would be site-specific and localized. Adherence to the Standards and Guidelines would result in mitigation of these possible impacts and a decrease in potential erosion and trampling. Impacts on specific areas would be identified and mitigated through a number of different means related to the grazing permit administration process (e.g., moving

salt blocks or water locations, fencing). With mitigation these impacts likely would be relatively minimal. Changes to grazing management could be subject to adherence of Section 106, which would mitigate impacts on cultural resources.

Non-Fire Vegetation Treatments

Not allowing mechanical vegetation treatments in fragile soil areas would protect cultural sites from short-term increases in erosion that could increase deterioration of sites. Over the long term, the lack of treatments could result in vegetation trending toward increased woodland cover, decreasing shrubs and grasses and therefore increasing erosion, and thus increasing deterioration of sites.

Other Management Actions

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 121,100 acres (22%). Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact cultural resources. This long-term impact generally would preserve cultural resources in place.

Impacts on cultural resources from implementing silvicultural practices would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or treatment, there would be an increased potential for identifying cultural resource sites. Mitigation for impacts would usually include avoidance. Impacts from incidental onsite use (e.g., campfires) activities not required to obtain permits would be similar to impacts from dispersed recreation.

Alternative B

Cultural Resource Management Actions

Compared to Alternative A, allocating cultural sites to use categories and managing them for their various uses would result in sites being proactively managed considering cultural resource sites' varied values. Because most cultural sites would be managed for scientific use, no use would occur on the sites until scientific study could recover the information associated with the sites. Allowing changes to site use allocations would allow for site-specific characteristics and circumstances to be addressed as varying situations arise.

Monitoring identified cultural sites that have known impacts and sites that are sensitive to incidental impacts would indicate if management actions are needed to protect the sites, decreasing the potential for losing cultural values as a result of deterioration and impact.

The prioritization of areas for proactive cultural resource inventories would result in the identification of cultural resources and sites, increasing the database of known sites in areas where the potential for incidental impacts are greatest and areas where the potential to identify sites is greatest. This information would assist in National Register recommendations and also would increase the knowledge base in this area while providing for improved management of these resources.

Precluding surface disturbing activities within ¼ mile or within the visual horizon, whichever is closer, of cultural landscapes eligible for the National Register generally would protect these areas from visual intrusions. However, there could be areas where cultural landscapes extend beyond the ¼ mile where visual intrusions in the landscape could be allowed. In these areas, adherence to federal regulations would result in consideration and mitigation of these impacts. Compared to Alternative A, it would be easier to mitigate visual intrusions beyond the ¼ mile due to the setback.

Coordination with Native American Tribes to identify and manage traditional cultural properties could result in the identification of traditional cultural properties. If traditional cultural properties were identified, management of these sites for traditional use could result in avoidance of surface disturbing actions in and around the sites, either temporally or spatially. The cultural resource sites would be preserved in place, and Native American concerns taken into account.

OHV Access and Use (Cross-Country Use and Use on Designated Routes)

Cross-country OHV use would be allowed on approximately 1,100 acres (<1%); however, the potential for impacts on cultural resources is low because the areas proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes) or human use (e.g., sand dunes and topsoil pit). There is a potential for inadvertent unmitigated damage of sites prior to Section 106 inventory. These areas have either had Section 106 compliance completed (mineral developments) or are the highest priority for cultural resource inventories in compliance with Section 106.

Limiting OHV use to designated routes on 524,000 acres (95%) would increase protection to cultural resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease impacts compared to Alternative A. Cultural resources away from designated routes would be protected from OHV impacts. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country use, impacts on cultural resources from OHV use on designated routes, as discussed under Alternative A, would be limited to 1,387 miles (92%) of designated routes. There would be no impacts from OHV use on 28,900 acres (5%) closed to OHV use, in areas away from the designated routes, and on 118 miles (8%) of closed routes.

Reducing temporary roads associated with temporary projects and reclaiming unnecessary facilities and improvements would maintain and/or improve the isolated nature of the cultural sites, protecting them from incidental damage. Limiting OHV use to designated routes in areas with fragile soils would eliminate impacts from cross-country OHV use and not increase erosion above natural rates in these areas. This would maintain existing levels of natural deterioration to cultural sites.

Oil and Gas Leasing and Development

Cultural resource values on 420,100 acres (76%) open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) could be impacted by oil and gas leasing. Compared with Alternative A, the area decreases by 53,300 acres (11% decrease); however, acres open to leasing subject to the standard terms and conditions on the lease form would decrease by 38 percent. Although cultural site densities vary in different areas throughout the decision area (Chapter 3, Section 3.2.9, Cultural Resources), site densities are low enough to provide for the avoidance, following identification, of cultural sites when leasees exercise initial development rights associated with oil and gas leases. Based on the RFD, oil and gas developments within these areas would impact 2,070 acres over the life of this plan (Appendix I). Development on these acres would typically be subject to Class III cultural resource inventories and evaluation on a project-by-project basis prior to allowing disturbance. This likely would result in the identification of between 10 (low site density) and 226 (high site density) cultural sites in these areas. Site densities throughout the decision area generally would result in the identification and avoidance of cultural sites during development. However, development in areas of very high cultural site density could result in the identification of sites that are unavoidable to mineral development. Sites that are unavoidable would be physically altered or eliminated during mitigation activities such as data recovery or other onsite means, as determined through the Section 106 process. Although the physical site could be altered or eliminated,

excavation would preserve the artifacts and information associated with the site, maintaining the cultural values.

Managing 478,200 acres (86%) as open to oil and gas leasing (open to oil and gas leasing subject to the standard terms and conditions, open to oil and gas leasing subject to moderate constraints (timing limitations, CSU), and open to oil and gas leasing subject to major constraints [NSO]) could result in 906 acres of surface disturbance from seismic operations supporting oil and gas leases. Compared with Alternative A, there would be a 700-acre (<1%) decrease in the number of acres open; however the number of acres of potential surface disturbance would not change. This likely would result in the identification of between 4 (low site density) and 99 (high site density) cultural sites in these areas. On identification, seismic operations likely would be able to avoid all the identified sites.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect cultural resources from such activities. Such decisions include restrictions on cultural sites and uses of fish and wildlife and special status species habitat and riparian/wetland areas. The reduction or elimination of development in these areas would result in fewer Section 106 inventories, reducing the potential for site identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make cultural resource studies more difficult. However, inventories associated with other activities (e.g., vegetation treatments for soils, watersheds, habitat, livestock grazing, and fuels reduction) could still result in the identification of cultural sites, as noted in the impacts from those decisions throughout this analysis.

Cultural resources on 133,900 acres (24%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be preserved in place from oil and gas development. Compared with Alternative A, there would be a 53,300-acre (66%) increase in the number of acres. This would include areas of high cultural site density near water sources, reducing the potential to identify sites and the potential to have unavoidable sites that require data recovery. In these areas there would be a reduction in the potential for site identification and recordation associated with oil and gas development, compared with areas open for oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, cultural resources in areas that would be closed to mineral materials activities (78,500 acres,14%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 9,500 acres, 2%, respectively) would also be protected in place from extraction of those minerals.

Recreation Use

The identification of and management associated with seven SRMAs on 125,800 acres (23%) would provide for management at popular dispersed use areas. This could result in some minor developments that would focus recreation use, minimizing long-term impacts. This would decrease the potential for inadvertent damage of cultural sites compared to Alternative A. In addition, allowing vehicle parking for dispersed camping within 150 feet of designated routes could result in vehicles associated with dispersed camping generally impacting surface features, breaking artifacts, and otherwise disturbing cultural resources at the surface. However, this impact would not exceed the potential impacts in Alternative A that result from allowing cross-country OHV travel throughout most of the decision area, resulting in an overall reduction in impacts compared to Alternative A.

Increased public awareness through educational opportunities would emphasize the importance of protecting cultural resources. Interpretive signs and markers identifying cultural resources would inform and educate the public, thereby increasing compliance with RMP actions and increasing preservation of cultural resources. In addition, providing interpretive opportunities could provide more cultural resource

sites for public use and education. This may require inventories to recover scientifically important data prior to allowing public use of the sites. Increased interpretation opportunities would increase public appreciation for the decision area's cultural values. Increased emotional linkages associated with public appreciation could lead to increased user stewardship behavior (Sharpe and Ewert 2000). Major impacts associated with stewardship behavior include increased protection of cultural sites, decreased inadvertent damage to or disturbance of cultural sites, decreased vandalism and looting, and preserving the integrity of cultural resources.

Providing heritage tourism opportunities throughout the decision area could provide more cultural resource sites for public use and education. This may require inventories to recover scientifically important data prior to allowing public use of the sites.

Requiring SRPs when sensitive cultural resources could be impacted by permitted recreation use would allow for potentially affected cultural resource sites to be avoided.

Livestock Grazing

In addition to the impacts described in Alternative A, reallocating forage from livestock on the Water Canyon Allotment would eliminate the potential for grazing-related impacts on cultural resources in this area.

Non-Fire Vegetation Treatments

Vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, livestock rangeland treatments, fuels treatments, and stewardship contracting) would not be allowed to exceed an annual average of 22,300 acres (446,000 acres over the life of the plan). This would ensure vegetation manipulation and associated short-term increases in soil erosion do not exceed historic levels of disturbance. In addition, allowing use of the full range of upland vegetation treatment methods and tools (i.e., prescribed fire, mechanical, chemical, biological, woodland product removal, and wildland fire use) would provide for the most acres of vegetation to be treated. More acres of vegetation treatment could result in the identification of more cultural resource sites. Over the long term, the increase in the opportunities for vegetation treatments also could reduce the potential for impacts from catastrophic wildfires and have the greatest long-term reduction in pinyon-juniper encroachment and the associated reduction in soil erosion. However, because no acres would be required to be treated, impacts could be the same as described Alternative A.

Other Management Actions

Retaining crucial wildlife habitat and riparian areas in public ownership could also result in cultural sites being retained, ensuring that the sites are protected.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 169,600 acres (31%). This would be a 140% increase in acres compared with Alternative A. Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact cultural resources. This long-term impact generally would preserve cultural resources in place.

Impacts on cultural resources from implementing silvicultural practices and Native American harvest activities would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or treatment, there would be an increased potential for identifying cultural resource sites. Mitigation for impacts would usually involve avoidance of any sites. Impacts from non-commercial harvest activities not required to obtain permits would be similar to the impacts from dispersed recreation.

Alternative C

Cultural Resource Management Actions

Compared to Alternative A, allocating and managing cultural resource sites for their various uses would result in sites being proactively managed compared to Alternative A, considering cultural resource sites' varied values. Because most cultural sites would be managed for scientific use, no use would occur on the sites until scientific study could recover the information associated with the sites.

Monitoring of identified cultural sites with known impacts and sites that are sensitive to incidental impacts would indicate if management actions are needed to protect the sites, decreasing the potential for losing cultural values due to deterioration and impact.

The prioritization of areas for proactive cultural resource inventories would result in the identification of cultural resources and sites, increasing the database to assist in National Register recommendation. This would increase the knowledge base in this area while providing for improved management of these resources.

Precluding surface disturbing activities within ¼ mile or within the visual horizon, whichever is farther, of cultural landscapes eligible for the National Register would protect these areas from visual intrusions.

OHV Access and Use (Cross-Country Use and Use on Designated Routes)

Limiting OHV use to designated routes on 388,300 acres (70%) would provide increased protection to cultural resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease impacts compared to Alternative A. Cultural resources away from designated routes would be protected from OHV impacts. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country OHV use, impacts on cultural resources from OHV use on designated routes, as discussed in Alternative A, would be limited to 884 miles (59%) of designated routes managed as open for use and 306 miles (20%) of routes where use would be limited seasonally during the winter when use could result in the greatest damage to adjacent cultural sites due to soft soils and increased runoff from the routes. There would be no impacts from OHV use on 165,700 acres (30%), in areas away from the designated routes, and on 315 miles (21%) of closed routes.

Impacts from reducing temporary roads associated with temporary projects, and designating routes in areas with fragile soils would be the same as described in Alternative B.

Oil and Gas Leasing and Development

Cultural resource values on 298,300 acres (54%) open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) could be impacted by oil and gas leasing. Compared with Alternative A, the acreage decreases by 175,100 acres; however, acres open to leasing subject to the standard terms and conditions would decrease by 93%, comprising 393,800 acres. Although cultural site densities vary in different areas throughout the decision area (Chapter 3, Section 3.2.9, Cultural Resources), site densities are low enough to provide for the identification and avoidance of cultural sites when lessees exercise initial development rights associated with oil and gas leases. Based on the RFD, oil and gas developments within these areas would impact 2,070 acres over the life of this plan (Appendix I). Development on these acres would typically be subject to Class III cultural resource inventories and evaluation on a project-by-project basis prior to allowing disturbance. This likely would result in the identification of between 10 (low site density) and 226 (high site density) cultural sites in these areas. Site densities throughout the decision area generally would result in the identification and avoidance of cultural sites during development. However,

development in areas of very high cultural site density could result in the identification of sites that are unavoidable to mineral development. Sites that are unavoidable would be physically altered or eliminated during mitigation activities such as data recovery or other onsite means, as determined through the Section 106 process. Although the physical site could be altered or eliminated, excavation would preserve the artifacts and information associated with the site, maintaining the cultural values.

Managing 381,400 acres (69%) as open to oil and gas leasing (open to oil and gas leasing subject to the standard terms and conditions, open to oil and gas leasing subject to moderate constraints (timing limitations, CSU), and open to oil and gas leasing subject to major constraints [NSO]) could result in 906 acres of surface disturbance from seismic operations supporting oil and gas leases. Compared with Alternative A, there would be a 97,500-acre decrease (20% decrease) in the number of acres open; however, the acres of potential surface disturbance would not change. This likely would result in the identification of between 4 (low site density) and 99 (high site density) cultural sites in these areas. On identification, seismic operations likely would be able to avoid all the identified sites.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (6%, 32,700 acres) would protect cultural resources from such activities. Such decisions include restrictions on cultural sites and uses of fish and wildlife and special status species habitat, fragile soil areas, and riparian/wetland areas. The reduction or elimination of development in these areas would result in fewer Section 106 inventories, reducing the potential for site identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make cultural resource studies more difficult. However, inventories associated with other activities (e.g., vegetation treatments for soils, watersheds, habitat, livestock grazing, and fuels reduction) could still result in the identification of cultural sites, as noted in the impacts from those decisions throughout this analysis.

Cultural resources on 255,700 acres (46%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be preserved in place from oil and gas development. Compared with Alternative A, there would be a 175,100-acre increase (217% increase) in these acres. Alternative C would include more areas of high cultural site density near water sources than Alternatives A and B, further reducing the potential to identify sites and the potential to have unavoidable sites that require data recovery. In these areas the potential for site identification and recordation associated with oil and gas development would be reduced when compared with the potential for site identification and recordation associated with areas open to oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, cultural resources in areas that would be closed to mineral materials activities (175,000 acres, 32%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 158,800 acres, 29%, respectively) would also be protected in place from extraction of those minerals.

Recreation Use

The identification of and management associated with seven SRMAs on 129,050 acres (23%) would provide for management at popular dispersed use areas. This could result in some minor developments that would focus recreation use, minimizing long-term impacts. This would decrease the potential for inadvertent damage of cultural sites compared to Alternative A. In addition, allowing vehicle parking for dispersed camping within 100 feet of designated routes could result in vehicles associated with dispersed camping generally impacting surface features, breaking artifacts, and otherwise disturbing cultural resources at the surface.

Impacts from interpretation and environmental education, heritage tourism, and SRPs would be the same as described in Alternative B.

Livestock Grazing

In addition to the impacts described in Alternative B, reallocating forage from livestock on the Lower North Fork and Sawmill Allotments would eliminate the potential for grazing-related impacts on cultural resources in these areas.

Non-Fire Vegetation Treatments

Vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, and stewardship contracting) would be required on an annual average of at least 4,650 acres (93,000 acres over the life of the plan). Focusing on treatment methods that use or mimic natural processes (e.g., prescribed fire, biological, and hand cutting) would limit the tools available to treat degraded vegetation stands, decreasing the number of acres that could be treated. This could result in the continued degradation of some vegetation stands, leading to an increase in soil erosion and greater potential for catastrophic wildfires and associated impacts on cultural sites. Not allowing treatments to exceed an annual average of 22,300 acres (446,000 over the life of the plan) would ensure vegetation manipulation and associated short-term increases in soil erosion do not exceed historic levels of disturbance.

Other Management Actions

Retaining crucial wildlife habitat and riparian areas in public ownership could also result in cultural sites being retained, ensuring that the sites are protected.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 268,300 acres (48%). This would be a 221 percent increase in acres compared with Alternative A. Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact cultural resources. This long-term impact would generally preserve cultural resources in place.

Precluding timber harvest would indirectly reduce the potential for surface disturbance, resulting in no cultural sites being identified during permitting for this activity.

Alternative D

Cultural Resource Management Actions

Under Alternative D, allocating and managing cultural resource sites for their various uses would result in sites being proactively managed compared to Alternative A, considering cultural resource sites' varied values. Because most cultural sites would be managed for scientific use, no use would occur on the sites until scientific study could recover the information associated with the sites.

Precluding surface disturbing activities within ¼ mile or within the visual horizon, whichever is farther, of cultural landscapes eligible for the National Register would protect these areas from visual intrusions.

Monitoring identified cultural sites that have known impacts and sites that are sensitive to incidental impacts would indicate if management actions are needed to protect the sites, decreasing the potential for losing cultural values due to deterioration and impact.

The prioritization of areas for proactive cultural resource inventories would result in the identification of cultural resources and sites, increasing the database to assist in National Register recommendation. This would increase the knowledge base in this area and assist in improved management (e.g., protection, study, and interpretation) of these resources compared to Alternative A.

Impacts on cultural landscapes eligible for the National Register would be considered through adherence to federal regulations. This could protect the cultural characteristics of the landscapes; however, activities could be permitted that could result in the degradation or loss of landscape characteristics.

OHV Access and Use (Cross-Country Use and Use on Designated Routes)

Cross-country OHV use would be allowed on 1,100 acres (<1%) and ephemeral washes; however, the potential for impacts on cultural resources is low because the areas proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes and ephemeral washes) or human use (e.g., sand dunes, Garfield County Motocross, Kaneplex area, and topsoil pit). There is a potential for inadvertent unmitigated damage of sites prior to Section 106 inventory. These areas have either had Section 106 compliance completed (mineral developments) or are the highest priority for cultural resource inventories, in compliance with Section 106.

Limiting OHV use to designated routes on 525,300 acres (95%) would provide increased protection to cultural resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease impacts compared to those identified in Alternative A. Cultural resources away from designated routes would be protected from OHV impacts. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country OHV use, impacts on cultural resources from OHV use on designated routes, as discussed under Alternative A, would be limited to 1,464 miles (97%) of designated routes. There would be no impacts from OHV use on 27,600 acres (5%) closed to OHV use, in areas away from designated routes, or on 41 miles (3%) of closed routes.

Impacts from reducing temporary roads associated with temporary projects, and designating routes in areas with fragile soils would be the same as described in Alternative B.

Oil and Gas Leasing and Development

Cultural resource values on 455,900 acres (82%) open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) could be impacted by oil and gas leasing. Compared with Alternative A, such acreage decreases by 17,500 (4%). Although cultural site densities vary in different areas throughout the decision area (Chapter 3, Section 3.2.9, Cultural Resources), site densities are low enough to provide for the identification and avoidance of cultural sites when lessees exercise initial development rights associated with oil and gas leases. Based on the RFD, oil and gas developments within these areas would impact 2,070 acres over the life of this plan (Appendix I). Development on these acres would typically be subject to Class III cultural resource inventories and evaluation on a project-by-project basis prior to allowing disturbance. This likely would result in the identification of between 10 (low site density) and 226 (high site density) cultural sites in these areas. Site densities throughout the decision area generally would result in the identification and avoidance of cultural sites during development. However, development in areas of very high cultural site density could result in the identification of sites that are unavoidable to mineral development. Sites that are unavoidable would be physically altered or eliminated during mitigation activities such as data recovery or other onsite means, as determined through the Section 106 process. Although the physical site could be altered or eliminated, excavation would preserve the artifacts and information associated with the site, maintaining the cultural values.

Impacts from seismic operations supporting oil and gas leases would be the same as described in Alternative A.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect cultural resources from such activities. Such decisions include restrictions on uses of fish and wildlife and special status species habitat and riparian/wetland areas. The reduction or elimination of development in these areas would result in fewer Section 106 inventories, reducing the potential for site identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make cultural resource studies more difficult. However, inventories associated with other activities (e.g., vegetation treatments for soils, watersheds, habitat, livestock grazing, and fuels reduction) could still result in the identification of cultural sites, as noted in the impacts from those decisions throughout this analysis.

Cultural resources on 98,100 acres (18%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be preserved in place from oil and gas development. Compared with Alternative A, there would be a 17,500-acre (22%) increase in these acres. This would include areas of high cultural site density near water sources, reducing the potential to identify sites compared to Alternative A and the potential to have unavoidable sites that require data recovery. In these areas the potential for site identification and recordation associated with oil and gas development would be reduced when compared with the potential for site identification and recordation associated with areas open to oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, cultural resources in areas that would be closed to mineral materials activities (21,200 acres, 4%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 7 acres, <1%, respectively) would also be protected in place from extraction of those minerals.

Livestock Grazing

In addition to the impacts described in Alternative A, reallocating forage from livestock to other uses on the Lower North Fork and Sawmill Allotments could eliminate the potential for grazing-related impacts on cultural resources in these areas.

Recreation Use

The identification of and management associated with four SRMAs on 122,800 acres (22%) would provide for management at a few popular dispersed use areas, specifically including a large OHV use area north of Kanab. Management of these areas could result in some minor developments that would focus recreation use, minimizing long-term impacts. This would decrease the potential for inadvertent damage of cultural sites compared to Alternative A. In addition, allowing vehicle parking for dispersed camping within 200 feet of designated routes could result in vehicles associated with dispersed camping generally impacting surface features, breaking artifacts, and otherwise disturbing cultural resources at the surface.

Impacts from interpretation and environmental education, heritage tourism, and SRPs would be the same as described in Alternative B.

Non-Fire Vegetation Treatments

Impacts from non-fire vegetation treatments would be the same as described in Alternative B.

Other Management Actions

Retaining riparian areas in public ownership could also result in cultural sites being retained, ensuring that the sites are protected.

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 135,300 acres (24%). This would be a 112% increase in acres compared with Alternative A. Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact cultural resources. This long-term impact generally would preserve cultural resources in place.

Impacts on cultural resources from implementing silvicultural practices and Native American harvest activities would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or treatment, there would be an increased potential for identifying cultural resource sites. Mitigation for impacts would usually involve avoidance of sites. Impacts from non-commercial harvest activities not required to obtain permits would be similar to impacts from dispersed recreation.

Summary

The BLM would continue to mitigate impacts on cultural resources from authorized uses through project avoidance, redesign, and, if necessary, data recovery. However, cultural resources would continue to deteriorate through natural agents and inadvertent damage.

Although the areas available for mineral development vary by alternative, the anticipated demand for development would not vary by alternative. Under Alternatives B and D, increased restrictions on areas of high cultural resource potential would decrease the number of sites that could be identified or affected by mineral development because such development would be occurring in areas of lower site density. In Alternative C, the restrictions would increase, further reducing the number of sites that could be identified by mineral development. Due to inventories associated with mineral development (mineral materials, locatable minerals, oil and gas, and coal), between 28 (low site density) and 658 (high site density) cultural sites would be identified over the life of the plan. Most identified sites would be avoided, although sites identified during development of the surface coal mine (between 9 and 219 sites) likely would be eliminated following data recovery.

Cross-country OHV use under Alternative A could result in significant damage to cultural sites. Under Alternatives B, C, and D, such use would be limited to areas that have already been disturbed. In areas limited to designated routes, impacts from vehicle use off the route would be eliminated, but sites adjacent to routes could be damaged. These sites would be identified through inventories of routes on a case-by-case basis.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Laws protecting cultural resources generally would provide for mitigation of irreversible and irretrievable impacts on cultural resources from permitted activity. However, development of a surface coal mine would impact a large number of sites (approximately 100). The large number of sites might make it not feasible to mitigate all of the National Register–eligible sites through data recovery. Loss of these sites without mitigation would result in an irretrievable loss of data. Development of a scientific research design prior to development of the coal mine would result in mitigation of those sites with the greatest potential for data recovery. In addition, areas of high cultural sensitivity that are open to cross-country OHV use in Alternative A could result in destruction of some resources, a loss that would be irreversible and irretrievable. Cultural sites that are wholly eliminated due to short-term uses such as scientific data recovery efforts and data recovery supporting surface disturbing activities would no longer be available for further study. Although data would be recovered through scientific means, the complete excavation of a site would result in an irreversible and irretrievable commitment of resources.

Unavoidable damage to cultural resources from permitted activities could occur if resources that were not detected during surveys were identified during ground disturbing activities. In these instances, further impacts would be ceased on discovery and the resource would be mitigated to minimize data loss. Unavoidable loss or destruction of cultural resources would also occur in areas open to cross-country OHV use, which would be greatest under Alternative A. Because areas open to cross-country OHV use in Alternatives B and D are not in areas of high cultural sensitivity, there would be a low potential for unavoidable impacts. Unavoidable loss of cultural resources due to non-recognition, lack of information and documentation, erosion, and inadvertent damage or use would also occur. Broad-scale sampling and classification of areas with a high likelihood of containing cultural resources would be expected to reduce the probability of unavoidable adverse impacts on the resource.

4.2.9 Impacts on Paleontological Resources

Impacts on paleontological resources occur from natural weathering and erosion, surface disturbing activities, excavation, and theft or vandalism. In general, fossil resources are physically destroyed through such agents or activities, or, in the case of illegal theft and vandalism, important contextual data is also irretrievably lost. Unlike cultural resources, which exist largely at or near the land surface, paleontological resources are found both at the surface and throughout the subsurface environment. As a result, actions that may destroy a fossil presently at the surface (e.g., coal mining or road construction) may at the same time expose new resources that were deeply buried in rock strata. In this same manner, erosion is continually bringing new fossils to the surface even as it destroys what is presently exposed. For management purposes, impacts must be set against the context of the rarity of individual fossil specimens. As erosion brings a particular fossil specimen to the surface, if it is a relatively common and well understood fossil species or is a non-diagnostic portion of a potentially rare form, impacts on that resource, up to and including its complete physical destruction are not significant. By definition, all vertebrate fossils are considered rare by the BLM and impacts on these types of fossils are of greatest concern.

BLM paleontological resource management policy is to identify, evaluate, and, where appropriate, protect scientifically significant paleontological resources, ensuring that proposed land uses, initiated or authorized by the BLM, do not inadvertently damage or destroy these resources (BLM Manual 8270, *Paleontological Resource Management*). BLM policy also requires the facilitation of appropriate scientific, educational, and recreational uses of paleontological resources, such as research and interpretation. Surface disturbing actions are required to mitigate damage to paleontological resources. Mitigation measures include project relocation or redesign (avoidance) and use of scientific data recovery methods. Avoidance is the BLM's preferred mitigation measure for surface disturbing activities. Standard assessment/inventory and avoidance procedures conducted in conjunction with surface disturbing actions would protect most paleontological resources from significant impacts. In general, impacts on paleontological resources from ground disturbance are long term in nature. Although natural erosion, exposure, and deterioration of paleontological localities may be slowed or halted, damage to fossils and localities cannot typically be reversed.

The impact analysis and conclusions are based on the BLM's knowledge of resources and the project area, review of existing literature, spatial analysis, and information provided by other agencies. Impacts are quantified where possible. In the absence of quantitative data, qualitative impacts and the direction of impact were identified. The analysis is based on the following assumptions:

- Paleontological resources will continue to be discovered throughout the decision area.
- Recovery and curation in paleontological resources by permitted specialists results in resource protection and preservation of paleontological values and in educational opportunities.
- Paleontological resources identified during assessments and inventories would be protected through data collection and mitigation.
- The number of localities that could be impacted by various actions would be directly correlated with the degree, nature, and quantity of surface disturbing activities within the decision area.
- Surface disturbing activities could expose, dislodge, or damage paleontological resources and features that were not visible prior to surface disturbance.

Under all alternatives, impacts on paleontological resources are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, cultural resources, livestock grazing, and other designations.

Impacts Common to All Alternatives

Paleontological Resource Management

Monitoring scientifically significant paleontological localities would document the rate of deterioration and provide baseline data for possible site protection, restoration, or data retrieval.

Paleontological inventory data for the decision area is crucial for sound resource protection decisions. Annual compilations of all new paleontological localities should be updated and entered into a single comprehensive GIS database that is accessible to local resource specialists. This would ultimately lead to better resource protection because decision-makers would be empowered with emerging patterns for the spatial and temporal distribution of paleontological resources.

Providing interpretive opportunities could provide more paleontological resource sites for public use and education because inventories would be required to recover scientifically important data prior to allowing public use of the sites. Increased paleontological interpretation could also increase public appreciation for the decision area's paleontological values. Increased public appreciation could lead to increased user stewardship. Impacts associated with stewardship attitudes include increased protection of paleontological sites, decreased inadvertent damage to or disturbance of paleontological sites, decreased vandalism and looting, and preserving the integrity of paleontological resources.

Dispersed Recreation Activities

Unlike permitted activities (e.g., mineral development or ROW development) that are subject to site-specific evaluations and monitoring, dispersed recreation activities are not under the same degree of scrutiny prior to use. Because of their widespread occurrence and generally unsupervised nature, casual recreational use likely would result in unmitigated impacts on paleontological resources exposed at the surface. Most of this impact would result from unauthorized collecting and vandalism; however, unmitigated impacts could also result from any surface disturbing aspect of recreation.

Actions that Affect Vegetation Conditions

Wildland fire suppression activities (e.g., construction of fire lines, bulldozing of access roads, and general movement of heavy equipment) could disturb the surface, creating impacts on mineral soils and bedrock. Fossils could be dislodged or damaged from such disturbance.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Surface disturbing activities in an area where there are known or potential fossil resources could have significant impacts on those resources. Although in general the best places to see fossils exposed at the surface are where there is little to no vegetation, the spatial distribution of fossils is not controlled by soil or vegetative cover. Potential resource loss can occur even in soiled-over or heavily vegetated areas if the ground disturbance is deep enough to reach underlying bedrock. As a result the largest potential impacts on paleontological resources would occur where the largest surface disturbances occur in formations with high potential for paleontological resources.

Development of a 3,600-acre mine in the Alton coal field would result in damage to or loss of subsurface paleontological resources. This area is overlain by the Tropic shale, which has a high potential for paleontological resources. The process of stripping the overburden would fragment and displace fossil resources and remove them from their context. Monitoring the spoil heaps (stripped overburden) could result in the identification and recovery of some fossil resources, mitigating some of the loss.

Other Management Actions

Land exchanges, sales, or other disposals that remove public lands with fossil resources from federal ownership could create significant impacts on those resources by their irretrievable loss to the public. On the other hand, acquisition of fossil-rich lands through similar realty-related actions may actually benefit paleontological resources. Prior to any transferal of land from public ownership, paleontological resources must be inventoried, evaluated, and mitigated whenever necessary to ensure that lands with scientifically significant paleontological resources are retained or that the maximum benefit from known resources is obtained prior to disposal of such lands, in accordance with all existing federal policy.

Granting of special ROWs that preclude access, or any activity or designation that prevents scientific inquiry or excavation, could ultimately make recovery and preservation of specific significant specimens extremely difficult or impossible.

Alternative A

Paleontological Resource Assessments/Inventories

Paleontological resource assessments would be performed on a case-by-case basis prior to proposed land uses. Proposed land uses would include actions such as mineral exploration and development, development/construction within ROWs, recreation site development, vegetation treatment projects, forest/woodland product harvest, special recreation permitting, or construction of range improvements. Based on the findings of the assessment, mitigation would be implemented at all phases of development. Although assessments would minimize the potential for unmitigated impacts on known paleontological resources, they would not require an onsite inventory prior to all disturbances. This could result in the inadvertent damage of paleontological resources that were not identified prior to surface disturbance. Inadvertent damage to vertebrate fossils or other scientifically significant paleontological resources generally would be a significant impact, although mitigation could reduce the magnitude of damage through data recovery.

As case-by-case assessments continue, knowledge of the area's paleontological resources would continue to increase. Damage to vertebrate and significant non-vertebrate paleontological resources would be mitigated on a case-by-case basis. Mitigation would increase the knowledge and understanding of the area's paleontological resources and of the history of life on Earth. Although assessments could minimize the potential for unmitigated impacts on known paleontological resources, application of assessments on a case-by-case basis could result in significant damage to paleontological resources.

Paleontological resource inventories largely would continue in association with surface disturbing activities on a case-by-case basis. This would result in inventories of the paleontological resources not being based on scientific needs, but on where surface disturbance takes place.

Not coordinating with other agencies prior to inventories could result in resource damage or loss due to proposed actions on adjacent lands managed by other agencies.

Other Paleontological Resource Management

Hobby/personal use collection of paleontological resources would continue, as would education programs. Some inadvertent loss of significant invertebrate or paleobotanical specimens would be expected.

Not excavating and curating scientifically significant sites could result in natural deterioration of the sites and the loss of the associated paleontological information. Not monitoring scientifically significant sites

could result in the natural deterioration and/or incidental damage of the sites and the loss of the associated paleontological information.

Route Designation and Accessibility

Allowing cross-country OHV use on 466,600 acres (84%) would decrease vegetation density, increase erosion, and generally could break, spread, and otherwise disturb paleontological resources at the surface. The significance of this impact would depend on the scientific significance of the fossils that could be affected. Mitigation of paleontological resource damage would be accomplished through data recovery efforts implemented on a case-by-case basis when the damage is discovered. Limiting OHV use to 57 miles of designated routes could result in similar impacts. In these areas, impacts from vehicle use off the route would be eliminated. Designating existing routes that already receive OHV use as open for continued use would not, by the act of designation, result in increased impacts. Because the designated routes currently exist and receive use, additional impacts on and/or adjacent to them would be minimal. These impacts would also occur on the remainder of the 1,442 miles of inventoried routes that are not designated. Limiting OHV use to existing routes in areas with fragile soils would eliminate impacts from cross-country OHV use and not increase erosion above natural rates in these areas. This would maintain existing levels of natural deterioration to paleontological localities. Because of closure to OHV use, there would be no impacts from OHV use within the Paria Canyon–Vermilion Cliffs Wilderness (21,200 acres, 4%) or in areas away from the designated routes in areas where OHV use is limited to designated routes.

It is important to note that managing 84 percent of the decision area as open to cross-country OHV use also allows for motorized access to paleontological localities. Motorized access is important for the study and excavation of paleontological resources because such activities often require the use of heavy equipment and the extraction of large specimens. Managing most of the decision area for cross-country use provides access for continued paleontological excavations.

Mineral Development

Areas would be open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU) on 420,100 acres (76%) of areas with a high or medium potential for paleontological resources. Based on the RFD, oil and gas development within these areas could impact up to 2,070 acres over the life of this plan (Appendix I). In these areas, paleontological resources could be identified prior to oil and gas development if an assessment or inventory were performed. The potential for significant impacts would remain because of the lack of required inventories prior to surface disturbance. Vertebrate or other scientifically significant fossils could be inadvertently damaged from disturbance if they were not identified and avoided.

Managing 478,900 acres (86%) as open to oil and gas leasing (i.e., open to oil and gas leasing subject to the standard terms and conditions, open to oil and gas leasing subject to moderate constraints (timing limitations, CSU), and open to oil and gas leasing subject to major constraints [NSO]) could result in 906 acres of surface disturbance from seismic operations supporting oil and gas leases. If assessments were performed prior to these activities, paleontological localities could be identified. However, the potential for significant impacts would remain because of the lack of required inventories prior to surface disturbance.

Surface disturbance associated with the development of mineral materials (650 acres) and locatable minerals (400 acres) could impact paleontological resources in a manner similar to the impacts noted for oil and gas development. More localities could be identified prior to surface disturbance if an assessment were completed, but the potential for significant impacts would remain if vertebrate or other scientifically significant fossils were inadvertently damaged if they were not identified and avoided. Because no areas

would be closed to mineral material development, disturbance associated with such development could affect paleontological resources throughout the decision area.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (14,900 acres, 3%) would protect paleontological resources from such activities. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would result in fewer assessments, reducing the potential for site identification with surface disturbing developments. In addition, such restrictions on surface disturbance could make paleontological resource studies more difficult.

Paleontological resources on 80,200 acres with a high or medium potential for paleontological resources (16% of areas with high and medium paleontological resource potential) that are open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be protected from oil and gas development. There would be a reduction in the potential to identify localities associated with oil and gas development compared with areas open to oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, paleontological resources in areas withdrawn from minerals entry (24,591 acres, 4%) would also be protected from potential impacts associated with the extraction of those minerals. There would be a reduction in the potential to identify localities associated with locatable mineral entry, compared with areas open to such location.

Actions that Affect Vegetation Conditions

Implementing limited vegetation treatments to improve wildlife habitat and livestock forage could include some methods of treatment that affect the soil (e.g., chaining and Dixie harrow). Such treatments could damage or destroy paleontological resources during treatment. Following some vegetation treatments, reduced vegetation could increase short-term erosion rates, exposing more paleontological resources for potential identification and increasing the potential to erode and remove the fossils from the bedrock with the associated diagnostic matrix. Some vegetation treatments could increase vegetative material on the ground (e.g., lop and scatter, Bull Hog), reducing erosion and maintaining the existing fossils in situ. Because of the limited nature of vegetation treatments in this alternative, the potential for impacts on paleontological resources would be low.

Maintaining healthy vegetation communities through adherence to the *Standards for Rangeland Health* would maintain soil resources, protecting paleontological localities from deterioration above natural rates. In addition, controlling erosion in frail watersheds would ensure disturbance does not result in increased soil erosion in these areas. This would protect paleontological resources in these areas from degradation associated with erosion above natural rates. However, because paleontological resources are usually discovered in eroded areas, reducing erosion could reduce the potential for more resources to be discovered in these areas.

Other Management Actions

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 121,100 acres (22%). Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact paleontological resources. This long-term impact generally would protect paleontological resources in place.

Impacts on paleontological resources from implementing silvicultural practices would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or

treatment, there would be an increased potential for identifying paleontological localities. Mitigation for impacts would usually include avoidance.

Alternative B

Paleontological Resource Assessments/Inventories

Requiring on-the-ground paleontological inventories prior to permitting surface disturbing activities in areas with a high potential for paleontological resources would result in the identification, evaluation, and protection, where appropriate, of scientifically significant fossil resources. By focusing on areas with a high potential, the formation and facies most likely to contain scientifically significant fossils would be scrutinized. If fossil resources are identified, mitigation measures could be applied to protect the resource. Mitigation measures include project relocation or redesign (avoidance) and various scientific data recovery methods, such as recordation, surface collection, subsurface testing, or excavation. These mitigation actions would prevent significant impacts on paleontological resources and increase the knowledge and understanding of the area's paleontological resources and of the history of life on Earth. In addition, projects such as development/construction within ROWs, recreation site development, or construction of range improvements would be studied prior to implementation.

Requiring assessments in areas with a medium potential for paleontological resources would allow for mitigation needs to be identified and implemented in areas less likely to contain significant fossils. There is a potential for some localities in areas with a medium potential to be damaged after surface disturbance begins if a field inventory were not performed. Based on the findings of the assessment, mitigation would be implemented at all phases of development.

As the number of paleontological inventories and assessments increases compared to Alternative A, knowledge of the area's paleontological resources would increase. More paleontological localities would be identified and there would be an associated reduction in the number of localities that are damaged prior to surface disturbing activity.

The prioritization of these areas for proactive inventories would identify paleontological resources and sites, increasing the database of resources. Compared to Alternative A, this would increase the knowledge base in this area while providing for improved management of these resources.

Consulting and coordinating with other local, state, and federal land agency paleontological resource specialists (if available) before undertaking significant ground disturbing activities in areas with a high potential for paleontological resources would ensure that information gathered concerning similar geologic formations and facies is shared among agencies. This will ensure that similar resources are protected both within and outside the decision area.

Other Paleontological Resource Management

Allowing surface collection of common invertebrate and botanical paleontological resources throughout the decision area could result in the incidental collection of scientifically significant resources. However, identifying and closing to casual collection areas with rare and significant fossils could reduce impacts from incidental collection compared to Alternative A.

Targeting fossil sites with high scientific value for excavation and curation would ensure that fossil sites with high scientific value are protected either through excavation and data recovery or through increased monitoring. In addition, monitoring high-significance (scientific or interpretive) sites with fossil resources that are not feasible/desirable to excavate/collect would ensure that fossil sites important to science and the public are protected from inadvertent damage or natural deterioration.

Route Designation and Accessibility

Although cross-country OHV use would be allowed on more than 1,100 acres (<1%), paleontological resources would not likely be damaged because the areas being proposed for cross-country use have been subject to disturbance over the past several years, either through natural processes (e.g., sand dunes) or human use (e.g., sand dunes and topsoil pit). In these areas, continued disturbance of previously disturbed areas would not result in impacts on paleontological localities.

Limiting OHV use to designated routes on 524,000 acres (95%) would provide increased protection to paleontological resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease impacts. Paleontological resources away from designated routes would be protected from OHV impacts. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country use, impacts on paleontological resources from OHV use on designated routes, as discussed under Alternative A, would be limited to 1,387 miles (92%) of designated routes. There would be no impacts from OHV use on 28,900 acres (5%) closed to OHV use, in areas away from the designated routes, and on 118 miles (8%) of closed routes. However, restricting motorized use to designated routes could also limit access for paleontological study and excavations, compared to Alternative A. In addition, reducing temporary roads associated with temporary projects and reclaiming unnecessary facilities and improvements would further reduce access for paleontological resource study, increasing their isolated nature. Although such isolation provides indirect protection from inadvertent damage, it also increases the potential for a locality to be damaged through natural deterioration prior to being identified and recovered.

Mineral Development

The potential for impacts from oil and gas development would decrease compared to Alternative A because 50,300 fewer acres (11% decrease) of area with high and medium potential for paleontological resources would be open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). However, according to the RFD (Appendix I), oil and gas development could still impact paleontological resources on as many as 2,070 acres over the life of this plan (Appendix I). Required inventories for areas that have a high potential for paleontological resources (170,200 acres, 67% of areas with a high potential) would result in the identification of more paleontological localities. In these areas, impacts on paleontological resources would be limited to damage of subsurface fossils not identified in the inventory. Required assessments in areas with a medium potential for paleontological resources (201,500 acres, 82% of areas with a medium potential) could also result in the identification of more paleontological resources. However, there would still be a potential for fossils in these areas to be damaged after surface disturbance begins.

Impacts from oil and gas exploration would decrease compared to Alternative A because inventories would be required in areas with a high potential for paleontological resources and because assessments would be required in areas with medium potential. Required inventories and assessments could identify more paleontological localities. However, the potential for impacts would remain in areas with a medium potential because of the lack of required inventories prior to surface disturbance.

Surface disturbance associated with the development of mineral materials (650 acres) and locatable minerals (400 acres) could impact paleontological resources in a manner similar to the impacts noted for oil and gas development. More localities could be identified prior to surface disturbance than Alternative A because of required inventories and assessments, which would result in avoidance and/or recovery of fossil resources.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect paleontological resources from such activities. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would result in fewer paleontological inventories, reducing the potential for locality identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make paleontological resource studies more difficult.

Paleontological resources on 130,300 acres with a high or medium potential (26% of areas with high and medium paleontological resource potential) that are open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing would be preserved in place from oil and gas development. Compared with Alternative A, there would be a 50,100-acre (62%) increase in these areas. In these areas there would be a reduction in the potential for identification and recordation of localities associated with oil and gas development, compared with areas open for oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, paleontological resources in areas that would be closed to mineral materials activities (78,500 acres, 14%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 9,500 acres, 2%, respectively) would also be protected from potential impacts associated with the extraction of those minerals. There would be a reduction in the potential to identify localities associated with locatable mineral entry, compared with areas open to such location.

Actions that Affect Vegetation Conditions

The number of acres that could receive vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, livestock rangeland treatments, fuels treatments, and stewardship contracting) could increase compared to Alternative A, potentially increasing the impacts on paleontological resources. Not allowing treatments to exceed an annual average of 22,300 acres (446,000 over the life of the plan) would ensure vegetation manipulation and associated short-term increases in soil erosion do not exceed historic levels of disturbance. In addition, allowing use of the full range of upland vegetation treatment methods and tools (i.e., prescribed fire, mechanical, chemical, biological, woodland product removal, and wildland fire use) would provide for the most acres of vegetation to be treated. This could result in the identification of more paleontological resource sites associated with more acres of vegetation treatment. Over the long term, the increase in the opportunities for vegetation treatments could also reduce the potential for impacts from catastrophic wildfires and the potential for long-term reduction in pinyon-juniper encroachment and the associated reduction in soil erosion. However because no acres would be required to be treated, impacts could be the same as discussed under Alternative A.

Other Management Actions

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 169,600 acres (31%). Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact paleontological resources. This long-term impact generally would protect paleontological resources.

Impacts on paleontological resources from implementing silvicultural practices would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or treatment, an increased potential would exist for identifying paleontological resource sites. Mitigation for impacts would usually include avoidance.

Alternative C

Paleontological Resource Assessments/Inventories

Requiring paleontological inventories throughout the decision area prior to permitting surface disturbing activities, regardless of the potential for paleontological resources, would result in the inventory, identification, and collection of paleontological resources throughout the decision area. Proposed land uses that would require inventories would include actions such as mineral exploration and development (including oil and gas development), development/construction within ROWs, recreation site development, vegetation treatment projects, forest/woodland product harvest, special recreation permitting, or construction of range improvements. Compared to Alternative A, this would result in the lowest potential for incidental damage to paleontological resources because no surface disturbance would occur until an on-the-ground inventory cleared the area to proceed and any paleontological resources were identified and avoided or recovered. In addition, increases in the number of acres inventoried would result in more paleontological localities identified than under the other alternatives. All impacts on identified paleontological sites from surface disturbing actions would be mitigated. Impact mitigation would minimize the potential for adverse effects to identified paleontological sites.

The prioritization of these areas for proactive inventories would identify paleontological resources and sites, increasing the database of resources. Compared to Alternative A, this would increase the knowledge base in this area while providing for improved management of these resources. Requiring such inventories annually would ensure that the knowledge and understanding of the decision area's paleontological resources increases. This will improve management of these resources.

Consulting and coordinating with other local, state, and federal land agency paleontological resource specialists (if available) before undertaking significant ground disturbing activities in areas with a high potential for paleontological resources would ensure that information gathered concerning similar geologic formations and facies is shared among agencies. This will ensure that similar resources are protected both within and outside the decision area.

Other Paleontological Resource Management

Allowing collection of common invertebrate and botanical paleontological resources in specifically designated areas reduces the potential for incidental collection of scientifically significant resources, compared to Alternative B. In these areas, non–scientifically significant paleontological resources could be removed. Areas with rare or scientifically significant resources would not be open for personal collection, thus protecting these resources.

Targeting fossil sites with high scientific value for excavation and curation would ensure that fossil sites with high scientific value are protected either through excavation and data recovery or through increased monitoring. In addition, monitoring high-significance (scientific or interpretive) sites with fossil resources that are not feasible/desirable to excavate/collect would ensure that fossil sites important to science and the public are protected from inadvertent damage or natural deterioration.

Route Designation and Accessibility

Limiting OHV use to designated routes on 388,300 acres (70%) would provide increased direct protection to paleontological resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease direct impacts compared to Alternative A. Paleontological resources away from designated routes would be protected from direct OHV damage. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country use, impacts on paleontological resources from OHV use on designated routes, as discussed under Alternative

A, would be limited to 884 miles (59%) of designated routes managed as open for use and 306 miles (20%) of routes where use would be limited seasonally during the winter when use could result in the greatest damage to adjacent paleontological sites due to soft soils and increased runoff from the routes. There would be no impacts from OHV use on 165,700 acres (30%), in areas away from the designated routes, and on 315 miles (21%) of closed routes. Although precluding cross-country OHV use would eliminate the potential for direct damage from OHVs, it could also limit access for paleontological study and excavations, compared to Alternative A. In addition, reducing the number of routes open for motorized use would further reduce the accessibility of remote paleontological localities. Although such isolation provides indirect protections from inadvertent damage, it also increases the potential for a locality to be damaged through natural deterioration prior to being identified and recovered.

Mineral Development

The potential for impacts from oil and gas development would decrease compared to Alternative A because 170,000 fewer acres (40% decrease) of high and medium potential for paleontological resources would be open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). According to the RFD (Appendix I), oil and gas development could still impact paleontological resources on as many as 2,070 acres over the life of this plan (Appendix I). However, requiring paleontological inventories prior to any surface disturbance would result in the identification of more paleontological localities. Impacts on paleontological resources throughout the decision area would be limited to potential damage of subsurface fossils not identified in the inventory. Impacts from oil and gas exploration would also decrease compared to Alternative A because inventories would be required throughout the decision area.

Surface disturbance associated with the development of mineral materials (650 acres) and locatable minerals (400 acres) could impact paleontological resources in a manner similar to the impacts noted for oil and gas development. More localities could be identified prior to surface disturbance than under Alternative A because of required inventories.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (32,700 acres, 6%) would protect paleontological resources from such activities. Such decisions include restrictions on uses of fish and wildlife habitat, ACECs, WSRs, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). The reduction or elimination of development in these areas would result in fewer inventories, reducing the potential for locality identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make paleontological resource studies more difficult.

Paleontological resources on 250,100 acres with a high or medium potential for paleontological resources that are open to oil and gas leasing subject to major constraints (NSO) and areas closed to oil and gas leasing would be protected from oil and gas development. Compared with Alternative A, there would be a 169,900-acre increase in these areas. In these areas there would be a reduction in the potential for identification and recordation of localities associated with oil and gas development, compared with areas open for oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, paleontological resources in areas that would be closed to mineral materials activities (175,000 acres, 32%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 158,800 acres, 29%, respectively) would also be protected from potential impacts associated with the extraction of those minerals. There would be a reduction in the potential to identify localities associated with locatable mineral entry, compared with areas open to such location.

Actions that Affect Vegetation Conditions

The number of acres that could receive vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, and stewardship contracting) would increase compared to Alternative A, thus increasing the potential impacts on paleontological resources. At least an annual average of 4,650 acres (93,000 acres over the life of the plan) would be treated, increasing short-term erosion and the exposure and potential loss of paleontological resources. Focusing on treatment methods that use or mimic natural processes (e.g., prescribed fire, biological, and hand cutting) would reduce the number of acres treated with methods that directly affect the soils, reducing the potential for direct damage to paleontological localities. Not allowing treatments to exceed an annual average of 22,300 acres (446,000 over the life of the plan) would ensure vegetation manipulation and associated short-term increases in soil erosion do not exceed historic levels of disturbance.

Other Management Actions

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 268,300 acres (48%). This would be a 147,200-acre increase compared with Alternative A. Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact paleontological resources. This long-term impact generally would protect paleontological resources in place.

Precluding forest and woodland product harvest would indirectly reduce the potential for surface disturbance, resulting in no paleontological localities being identified during permitting for this activity.

Alternative D

Paleontological Resource Assessments/Inventories

Requiring paleontological assessments prior to permitting surface disturbing activities in areas with a high potential for paleontological resources would lead to identification of new paleontological localities. Proposed land uses would include actions such as mineral exploration and development (including oil and gas development), development/construction within ROWs, recreation site development, vegetation treatment projects, forest/woodland product harvest, or construction of range improvements. Based on the findings of the assessment, mitigation would be implemented at all phases of development. Although assessments would minimize the potential for unmitigated impacts on known paleontological resources, they would not require an on-the-ground inventory prior to all disturbances. This could result in the inadvertent damage of paleontological resources that were not identified prior to surface disturbance. Inadvertent damage to vertebrate fossils or other scientifically significant paleontological resources generally would be a significant impact, although mitigation could reduce the magnitude of damage through data recovery. Not requiring assessments or inventories in areas with a medium potential for paleontological resources could result in damage to fossils after surface disturbance commences, resulting in the loss of scientifically significant paleontological resources.

Not coordinating with other agencies prior to inventories could result in duplicating efforts performed by adjacent land-management agencies. Not coordinating with other agencies could also result in cumulative damage from surface disturbing activities in areas outside the decision area.

Not requiring proactive inventories would slow the rate at which new paleontological localities are identified and reduce the number of localities that would be identified and excavated. Paleontological resource inventories largely would continue in association with surface disturbing activities on a case-by-case basis. This would result in inventories of paleontological resources not being based on scientific needs, but on where surface disturbance takes place.

Other Paleontological Resource Management

Impacts from other paleontological resource management would be the same as described in Alternative B.

Route Designation and Accessibility

Limiting OHV use to designated routes on 525,300 acres (95%) would increase protection to paleontological resources compared to Alternative A. The change from managing most of the decision area as open to cross-country OHV use under Alternative A to limiting OHV use to designated routes would decrease impacts compared to Alternative A. Paleontological resources away from designated routes would be protected from OHV impacts. Rather than the potential for increased disturbance and incidental damage associated with pioneered routes in areas open to cross-country OHV use, impacts on paleontological resources from OHV use on designated routes, as discussed under Alternative A, would be limited to 1,464 miles (97%) of designated routes. Although limiting cross-country OHV use to specific areas already would eliminate the potential for direct damage from OHVs, it would also limit access for paleontological study and excavations, compared to Alternative A. In addition, reducing the number of routes open for motorized use could further reduce the accessibility of remote paleontological localities. Although such isolation provides indirect protection from inadvertent damage, it also increases the potential for a locality to be damaged through natural deterioration prior to being identified and recovered. There would be no impacts from OHV use on 27,600 acres (5%), in areas away from the designated routes or on 41 miles (3%) of closed routes.

Mineral Development

The potential for impacts from oil and gas development would decrease compared to Alternative A because there would be 22,900 fewer acres (5% decrease) of high and medium potential for paleontological resources open to oil and gas leasing subject to the standard terms and conditions and open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). However, according to the RFD (Appendix I), oil and gas development could still impact paleontological resources on as many as 2,070 acres over the life of this plan (Appendix I). Required assessments for areas that have a high potential for paleontological resources (194,200 acres, 76% of areas with a high potential) could result in the identification of more paleontological localities. In these areas, impacts on paleontological resources generally would be limited to damage of subsurface fossils not identified in the inventory. However, there would still be a potential for fossils in these areas to be damaged after surface disturbance begins if a field inventory were not performed. Throughout the remainder of the decision area, assessments could be completed on a case-by-case basis, including on areas with a medium potential for paleontological resources (204,900 acres, 83% of areas with a medium potential). Paleontological resources in these areas could be identified during assessments, but the potential for significant impacts would remain due to the lack of required inventories or assessments prior to surface disturbance. Vertebrate or other scientifically significant fossils could be inadvertently damaged from disturbance if they were not identified and avoided.

Impacts from oil and gas exploration would decrease compared to Alternative A because inventories would be required in areas with a high potential for paleontological resources. Required assessments could identify more paleontological localities. However, the potential for impacts would remain in areas with a high potential and a medium potential because of the lack of required inventories prior to surface disturbance.

Surface disturbance associated with the development of mineral materials (650 acres) and locatable minerals (400 acres) could impact paleontological resources in a manner similar to the impacts noted for oil and gas development. More localities than under Alternative A could be identified prior to surface disturbance in areas with a high potential for paleontological resources because of required assessments,

which could result in avoidance and/or recovery of fossil resources. However, the potential for significant impacts would remain if vertebrate or other scientifically significant fossils were inadvertently damaged due to lack of identification and avoidance.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect paleontological resources from such activities. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance. The reduction or elimination of development in these areas would result in fewer Section 106 inventories, reducing the potential for site identification and recordation through data recovery associated with surface disturbing developments. In addition, such restrictions on surface disturbance could make paleontological resource studies more difficult.

Paleontological resources on 94,600 acres with a high or medium potential for paleontological resources (19% of areas with high and medium paleontological resource potential) that are open to oil and gas leasing subject to major constraints (NSO) and closed to leasing would be preserved in place from oil and gas development. Compared with Alternative A, there would be a 14,400-acre (18%) increase in these acres. In these areas there would be a reduction in the potential for site identification and recordation associated with oil and gas development, compared with areas open for oil and gas leasing subject to the standard terms and conditions and areas open to oil and gas leasing subject to moderate constraints (timing limitations, CSU). In addition, paleontological resources in areas that would be closed to mineral materials activities (21,200 acres, 4%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 7 acres, <1%, respectively) would also be protected from potential impacts associated with the extraction of those minerals. There would be a reduction in the potential to identify localities associated with locatable mineral entry, compared with areas open to such location.

Actions that Affect Vegetation Conditions

Impacts from non-fire vegetation treatments would be the same as described under Alternative B.

Other Management Actions

Restrictions on visually obtrusive developments on VRM Class I and Class II areas would limit development on 135,300 acres (14%). Although not a restriction on surface disturbance, management to preserve and maintain the landscape could reduce disturbance that could impact paleontological resources. This long-term impact generally would protect paleontological resources in place.

Impacts on paleontological resources from implementing silvicultural practices would be identified through the permitting process and mitigated prior to implementation. In areas proposed for harvest or treatment, an increased potential would exist for identifying paleontological localities. Mitigation for impacts would usually include avoidance. Impacts from non-commercial harvest activities not required to obtain permits would be similar to impacts from dispersed recreation.

Summary

Under all alternatives, some level of paleontological assessment would be required prior to permitting surface disturbing activities, which would provide a degree of protection to paleontological resources. The degree of damage from surface disturbing activities depends on many things, including paleontological potential in the area of proposed disturbance, the level of disturbance, and the type/level of assessment or inventory used to identify the paleontological resources. For Alternatives A and D, the assessment is the only identification required for paleontological resources facing damaged from surface disturbing activities, and in Alternative D it is required only in areas with a high potential for

paleontological resources. Because the assessments do not require an onsite inventory, the potential for inadvertent damage is highest under Alternatives A and D. Alternative C would provide the greatest degree of protection to paleontological localities because an onsite inventory would be required throughout the decision area prior to all surface disturbing activities. Alternative B requires such inventories in areas with a high potential, focusing on areas where damage would most likely occur. On identification, paleontological resources would be protected through project avoidance, redesign, abandonment, and data recovery investigations.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Inventories completed prior to surface disturbing activities generally would provide for mitigation of irreversible and irretrievable impacts on identified surface paleontological resources from permitted activities. However, subsurface paleontological resources could be irreversibly and irretrievably damaged and lost from activities that go deep into bedrock. Damage and loss of these subsurface resources would constitute an unavoidable adverse impact. For example, development of the coal mine in the Alton area would result in these irreversible and irretrievable impacts and unavoidable adverse impact. Areas open to cross-country OHV use, specifically areas of high potential for paleontological resources, could result in destruction of some resources, which would be irreversible and irretrievable. Land exchanges, sales, or other disposals that remove public lands with fossil resources from federal ownership could result in their irretrievable loss to the public. Short-term data recovery (collection) measures would result in long-term preservation of paleontological resources, limiting the loss of scientific values associated with the physical resources.

Unavoidable damage to paleontological resources from permitted activities could occur if resources undetected during assessments were identified during ground disturbing activities. If paleontological resources are identified during ground disturbance, further disturbance would cease and mitigation would be implemented to minimize data loss. This would be most likely to occur under Alternatives A and D, for which paleontological assessments would be required instead of onsite inventories. Unavoidable loss of paleontological resources due to non-recognition, lack of information and documentation, erosion, and inadvertent damage or use would also occur. Broad-scale sampling and classification of areas with a high likelihood of containing paleontological resources would be expected to reduce the probability of unavoidable adverse impacts on the resource.

4.2.10 Impacts on Visual Resources

This section presents potential impacts of the alternatives on visual resources, specifically the potential for management decisions to create visual changes in or contrasts from the existing landscape. Visual resources generally are impacted by activities that introduce new visual elements into the landscape, changing the features that characterize the existing landscape (e.g., the form, line, color, and/or texture of the landform, water, vegetation, or structures). Generally, the greater the surface disturbance, the greater the change to the landscape. This impact analysis and these conclusions are based on knowledge of resources and the decision area, review of existing literature, spatial and temporal analysis, and information provided by other agencies. Effects are quantified where possible. In the absence of quantitative data, professional judgment was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

The analysis is based on the following assumptions:

- VRM Classes (objectives) are prescriptive for all resources and uses. Activities proposed that would not initially meet VRM objectives for the area would be mitigated to the extent needed to meet the objectives. Those activities proposed that could not be mitigated would not be authorized.
- The visual resources "inventory classes represent the relative value of the visual resources" (BLM-H-8410 Visual Resource Inventory).
- New surface disturbing activities proposed would be subject to NEPA analysis, including a VRM contrast rating.
- Potential impacts on scenic quality were estimated by evaluating the potential for management actions to noticeably change existing landscapes. Current visual resource conditions, against which management impacts are compared, were identified through an inventory of visual resources. The scenic qualities of the landscape are measured comparatively by application of visual resources management classes (I, II, III, and IV) generated from the inventory (see VRM, Chapter 3). Impacts from actions proposed in Chapter 2, including alternative VRM objectives, are measured against the scenic quality of the existing landscape (as characterized by the inventory classes) identified in the inventory. Landscape modifications and impacts on visual resources would occur under any management objective (class). The degree of impact would depend on the visual objectives, the nature of the proposed project, and the observation point of the visitor.

All surface disturbing activities, regardless of the alternative or management action, would be subject to the management objectives of the area within which the activity takes place. The visual resource contrast rating system is used to analyze the potential site-specific impacts of surface disturbance and the facility design and placement. Surface disturbing activities and facilities would be designed to mitigate their visual impacts and conform to the area's designated VRM objective. Mitigation could include painting, facility design, and placement.

Under all alternatives, impacts on visual resources are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, cultural resources, and paleontological resources.

Impacts Common to All Alternatives

Visual Resource Management Classes

All of the alternatives would impact visual resources in varying degrees. Decisions that result in surface disturbance would have direct impacts on scenic quality by changing existing landscape characteristics. Similarly, decisions that reduce surface disturbance generally would decrease changes to the landscape or preserve scenic quality. The area of impact is not limited to the specific area of disturbance. Rather, the viewshed in which the disturbance occurs would be impacted. The severity of the impact, or the degree of change and contrast from the existing visual conditions, generally would decrease as distance from the disturbance increases. In addition, the larger the disturbance, the more visible it would be from foreground and middleground viewpoints, and thus the greater the impact on visual quality.

Setting VRM objectives would impact visual quality under all of the alternatives. Objectives for VRM Classes I and II would provide for the least amount of landscape change and the highest level of visual resource protection, both short and long term. VRM Classes III and IV objectives are less protective and would allow for more surface disturbing impacts and landscape change. VRM Class I areas would provide the greatest protection to visual resources throughout the decision area by restricting surface disturbance and development. Surface disturbing activities would not be allowed unless impacts could be mitigated to meet Class I objectives. Class II objectives would provide protection of visual qualities, retaining the existing character of the landscape. Class III objectives would not emphasize protection of an unmodified landscape and visual resources. Class IV objectives allow for major modifications of the landscape. Activities that occur in these areas would result in greater change to the characteristic landscape, and may not protect scenic values. For more information on VRM Class objectives, see Chapter 3, Section 3.2.11.

Wildland Fire

Fire (wild and prescribed fire) and fire suppression have many effects on the landscape, and thus its visual values, in both the short and long term. Most noticeably, fire affects vegetation. But fire suppression also affects, to a lesser degree, landform. When fire burns, it consumes vegetation. Fire severity varies depending on the vegetation community. In the decision area, fire in sagebrush communities would remove shrubs and grasses, and stimulate regrowth of new vigorous plants, maintaining the vegetative element of the landscape. Fire in these communities can also result in the invasion of exotic plants such as cheatgrass. In areas with the potential for invasion, fire would facilitate conversion of a landscape with some vegetative variety to a monoculture of grasses, and less visual interest and appeal. In pinyon-juniper woodlands, however, fire would help maintain openings in the woodland forest, more vegetation variety, and more visual appeal. In a coniferous forest, fire may contribute to the loss of trees and understory brush and grasses. The fire, however, would also create openings in forests, and stimulate regrowth of shrubs, forbs, and grasses, introducing new lines, colors, and textures to the vegetative component of the landscape. More variety often leads to more interest and more visual appeal to the visitor. Fire suppression would result in construction of fire lines (hand and bulldozer) that remove vegetation and expose the underlying soil. These actions would create noticeable lines in the vegetation and some disturbance to the landform. Soil disturbances would be rehabilitated at the end of the suppression effort, restoring the landform to a near natural condition. Linear vegetation removal, however, would take longer to recover, especially in forest and woodland environments. In the short term, burned vegetation would be unpleasant to view for many visitors. Over the long term, however, fire would often create variety in the vegetation of a landscape that is interesting and appealing to view, depending on vegetation type and size of the fire.

The effects of fire suppression on visual resources would vary depending on the methods used for suppression and the landform and vegetation community in which the fire occurs. Construction of fire

lines (hand or bull dozer), firebreaks, and access roads for the suppression effort would produce short- and long-term changes to the landscape and visual resources. Construction of firebreaks, fire lines, and temporary access roads would result in linear features in the vegetation community and landform. Depending on the vegetation community where the fire occurs, on distance, and on observation point, the contrast may be easily seen (e.g., in pinyon-juniper or coniferous forest communities) or less noticeable (e.g., in grassland or sage brush communities). Fire lines and access routes constructed by bulldozers would result in some leveling of landforms and exposure of soils, creating apparent lines in color, form, and texture of the landform. Effective rehabilitation would restore disturbed landforms in the short term, but disturbances in forest and woodland vegetation communities would remain for a much longer period of time. Access to areas in the vicinity of bulldozer lines and firebreaks would be restricted in the short term to speed vegetation recovery and soil stabilization, thus decreasing the duration of long-term visual contrasts in vegetation. Use of fire retardant would result in short-term impacts on the color of the vegetation. The characteristic red color of retardant would often be easily seen, but the color fades over time.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Construction of recreation sites and facilities (e.g., campgrounds, signs, interpretive sites, trailheads, roads, and parking areas) and the associated landform and vegetation disturbances needed to accommodate the facilities would directly impact visual resources by adding unnatural features at the site of the facilities and to the surrounding landscape. These facilities would be designed and located to meet visual objectives for the given area, but the effects would remain localized and long term. The visual effect would be less noticeable on a larger, landscape scale.

Management that Restricts Surface Disturbing Activities

Prohibiting surface disturbance in areas that contain special status species, as well as WSAs and the Paria Canyon–Vermilion Cliffs Wilderness, would also prevent long-term changes to the character of the landscape, and thus its visual values. Habitat restoration measures that include surface or vegetation disturbance, however, could create noticeable short-term changes in the landscape, as described in the effects of vegetation treatments. Protecting wildlife habitat through stipulations on other land uses (e.g., collocation of ROWs, utility corridors, and oil and gas wells, and limiting motorized travel) would reduce surface disturbance and landscape change, indirectly protecting scenic quality over the long term.

Livestock Grazing

Where livestock grazing continues to be authorized, the installation of livestock facilities (e.g., fences, cattle guards, water developments, and roads), and the landform and vegetation disturbances needed to accommodate the facilities, would directly impact visual resources by adding features not found in the surrounding landscape. Such impacts would be localized and long term. Areas with Class I or II management objectives would be more sensitive to construction of new facilities. Incorporating rangeland management practices and visual mitigation measures would help reduce the extent of visual impacts on the landscape.

Alternative A

Visual Resource Management Classes

There would be a one percent decrease in the area managed to preserve its existing landscape character (Class I management objectives), as compared to the area inventoried as Class I (Table 4-10). The difference arises from lands adjacent to but outside the Paria Canyon–Vermilion Cliffs Wilderness that were inventoried as Class II. In addition, there would be 124,300 acres more than the inventory that would provide for major modification of the landscape (Class IV management objectives).

Table 4-10. Visual Resource Management Class Acreages—Differences from Inventory Class Acreages

	Class I	Class II	Class III	Class IV
Visual Resource Inventory Class Acres	21,400	165,900	169,200	197,500
Alternative A[1]				
Visual Resource Management Class Acres	21,200	99,900	68,600	321,800
Acres Different from Inventory Class	–200	–66,000	–100,600	+124,300
Percent Change from Inventory Class	–1%	–40%	–59%	+63%
Alternative B				
Visual Resource Management Class Acres	76,000	93,600	211,500	172,900
Acres Different from Inventory Class	+54,600	–72,300	+42,300	–24,600
Percent Change from Inventory Class	+255%	– 44%	+25%	–12%
Alternative C				
Visual Resource Management Class Acres	168,300	100,000	128,300	157,400
Acres Different from Inventory Class	+146,900	–65,900	-40,900	–40,100
Percent Change from Inventory Class	+686%	–40%	-24%	–20%
Alternative D				
Visual Resource Management Class Acres	75,400	59,900	245,600	173,100
Acres Different from Inventory Class	+54,000	–106,000	+76,400	–24,400
Percent Change from Inventory Class	+252%	–64%	+45%	–12%

[1] There are 42,500 acres for which there is no existing/known VRM classification.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Visual resource values on 473,400 acres (86%) that would be open to oil and gas leasing subject to the standard terms and conditions or open to oil and gas leasing subject to moderate constraints (timing limitation, CSU) could be impacted by exploration and development where such activity occurs. The construction of well pads, access roads, pipelines, compressor stations, and other support facilities associated with oil and gas exploration and development would result in modification of the landscape on approximately 2,070 acres. Construction of these facilities would alter the landform, remove vegetation, and introduce human-made structures to the landscape. On steeper slopes, road and well pad construction would result in cutting and filling of soil to produce roadbeds and well pads. More soil disturbance would occur on steeper slopes than on gentler slopes. Vegetation removal and soil disturbance associated with roads and well pads would create lines and openings on the landscape because of vegetation removal and exposure of the underlying soil. Contrast would occur in the color, line, and texture of the vegetation community. Depending on the amount of cutting and filling for roads and well pads, changes to landform would also be observed (e.g., leveling of angular slopes). The degree of contrast would also be affected by the vegetation community (density and type of vegetation), soil type (color and texture), and observation point of the viewer. Installation of pipelines, compressor stations, and other support facilities would result in vegetation removal, soil disturbance, and placement of human-made structures on the landscape. The size of the facilities would dictate the degree of vegetation removal. The steepness of slope would affect the amount of soil disturbance and landform change. The design and location of facilities would impact their visibility on the land. When pipelines are buried and the soils and vegetation are rehabilitated, the changes to the landscape would be shorter term. Roads, well pads, wellheads, pump

jacks, and aboveground facilities would affect the landscape, and thus its visual appeal, over the long term. The density of development (i.e., well spacing) would affect the overall degree of impact, which could be small and localized or evident at a broader landscape level.

Generally, geophysical exploration would not result in changes to the landform or long-term placement of structures on the landscape. Geophysical exploration could result in short-term and site-specific impacts on vegetation on approximately 906 acres. The resultant impacts on visual resources would be small, localized, and temporary.

Development of coal and locatable and mineral materials (e.g., sand and gravel) would result in removal of vegetation, alteration of the landform, and placement of structures on the landscape. The construction of roads to the mine or materials site would create lines in the landscape through removal of vegetation and cutting and filling of soils for the roadbed. The type of vegetation and the slope of the landform would affect the degree of contrast created. Road construction on steep slopes would require more cutting and filling of soil than construction on shallower slopes. Placement of roads in dense vegetation would result in more evident lines through the vegetation. Roads on gentle terrain through sparse vegetation generally would result in less contrast on the landscape. Construction of mine pits, tunnels, and adits and the resultant waste piles would introduce horizontal lines and terraces, especially on steep or angular slopes. Removal of vegetation to accommodate these mine features would create changes in the line and texture of vegetation. Removal of mine ore or materials would result in pits, terraces, and stockpiles that would contrast with the existing form and line of the land. The exposure of soils likely would result in noticeable changes in the color of the landform. Mine equipment and buildings, and other support facilities would introduce human-made structures to an otherwise more natural landscape. The size and degree of these changes would vary with the size of the mining operation, topography (landform), soil type (color and texture), vegetation type, and position of the observer. Withdrawing areas from mineral entry and closure to mineral material disposal would maintain existing landscape and visual qualities of surrounding areas.

Although mineral development is projected to disturb 8,426 acres (Appendix I), the broader, surrounding landscape on which this disturbance is located would be altered by changes in landform, vegetation removal, and placement of structures. Any areas within the viewshed of the disturbances would be affected, reducing visual quality over larger areas. The complete magnitude of this impact would vary depending on the topography, vegetation, size of disturbance, and any mitigation actions that could be applied to reduce visual impacts.

Surface disturbances associated with the construction of pipelines, powerlines, and communication lines and towers would create both short- and long-term changes to the landscape. ROWs for these types of facilities are typically linear, and introduce strong lines to the landscape. Removal of vegetation (depending on the vegetation type) to facilitate construction and maintenance would create noticeable lines (edges) in the vegetation. Exposure of the underlying soil (depending on the color and texture) would also create strong lines in the landscape. Rehabilitation of the surface over buried facilities would reduce some of these impacts over the long term, but travel routes along the corridors to accommodate access for inspection and maintenance would maintain noticeable lines in the landscape. The placement of permanent facilities, such as towers, powerlines, and pipelines, would add noticeable linear horizontal and vertical structures to the landscape and would permanently alter viewsheds, particularly in undeveloped landscapes. ROW corridors would concentrate these facilities and reduce visual contrast throughout much of the rest of the decision area. Wind and solar energy development also would introduce highly visible structures, which would alter the existing character of the landscape.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (14,900 acres, 3%) would protect the existing character of the landscape. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). On 80,600 acres (14%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing, changes to the landscape would be prohibited by limitations on surface disturbance and occupancy. Visual resource values in areas withdrawn from mineral entry (24,591 acres, 4%) would be protected from changes in the landscape created by development of these minerals.

OHV Use and Route Designations

OHV routes create visible lines on the landscape. Depending on topography, the vegetation community, and the observation points, those lines would be visible to varying degrees. In addition, removal of vegetation would reveal the underlying soil, which often is a contrasting color and texture to the surrounding vegetation. This would further accentuate the change to the landscape. Areas where OHV use is limited to designated routes would limit impacts on the landscape to the existing transportation system, and eliminate the creation of new routes that would result in further changes to the landscape and visual quality.

Managing areas for cross-country OHV use could impact vegetation and expose soil, thereby increasing visual contrast form line, color, and texture. These impacts would be on 466,600 acres (84%) open to cross-country travel. OHV use on 66,200 acres (12%) would be limited to 57 miles of designated routes, creating no additional visual impacts. There would be no impacts from OHV use on 21,200 acres (4%) closed to OHV use.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Vegetation treatments (e.g., prescribed fire, mechanical, chemical, biological, and wildland fire) would change the vegetation component of the landscape and thus its visual character. The degree of change would vary, depending on the vegetation type treated, size of treatment area, and method of treatment. For example, vegetation treatments in pinyon-juniper vegetation communities (i.e., removal of invading pinyon and juniper trees) would be more visually apparent than vegetation treatments in sagebrush communities. The method of treatment would also affect the degree of change to the landscape. Chemical and biological treatment methods would create gradual changes in the vegetation pattern and visual contrasts. Prescribed and wildland fire and mechanical methods would create contrasts more suddenly and noticeably. Treated areas would add vegetation variety and contrast to the landscape, increasing interest and variety in form, line, color, and texture. In the short term, the treatment methods used to achieve fuel reduction objectives would create direct visual changes to the landscape. Over the long term, restoration and vegetation treatments designed to improve ecological conditions would create a mosaic vegetation pattern that would increase visual variety and interest and improve scenic quality. In the short term, however, the methods used to achieve improved ecological conditions would create direct visual changes to the landscape.

Harvest of woodland products, whether firewood, Christmas trees, or posts and poles, would remove vegetation from the landscape. Individual use would not result in substantial changes to vegetation communities, although popular cutting areas could show greater change in vegetation density. The effects to visual resources would be site-specific, but not noticeable on a landscape scale. Removal of vegetation would change the density and create small openings in the canopy of the forests. This would introduce change in the color and texture of the vegetation community over the long term, variation in the vegetative cover, and increase in the visual appeal of the landscape.

Replacement of native vegetation by noxious weeds reduces the variety in the vegetative component of the landscape, and thus its visual appeal. The presence of noxious weeds can increase the frequency of natural disturbance regimes (wildfire) and lead to the expansion of weeds and eventual replacement of native vegetation in an area, resulting in vegetative monocultures. Such vegetation replacement would result in reduced variety in vegetative landscapes and reduced visual appeal. Actions aimed at controlling and eliminating noxious weeds would reduce these impacts on the landscape.

Alternative B

Visual Resource Management Classes

Under Alternative B, more than twice as many acres would be managed to preserve their existing landscape character (Class I management objectives) as were inventoried as Class I (Table 4-4). The acres that would be managed by Class I objectives generally were inventoried as Class II and were adjusted due to the presence of a WSA. There would also be a shift of Class IV inventory areas to Class III management objectives on approximately 24,600 acres. This change in management would require visually obtrusive activities to decrease their visual impact through mitigation measures. In addition, the portion of the decision area southwest of U.S. Highway 89 between Kanab and Mt. Carmel Junction would be managed as VRM Class III even though much of it was inventoried as VRM Class II. This will allow vegetation treatments to be implemented to a greater extent in this concentrated area of pinyon-juniper woodland encroachment.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Impacts on landscapes and visual resources from mineral exploration and development, development within ROWs (i.e., powerlines, pipelines, and communication lines and towers), and wind and solar energy development would be the same as described in Alternative A.

Visual resource values on 420,100 acres (76%) that would be open to oil and gas leasing subject to the standard terms and conditions or open to oil and gas leasing subject to moderate constraints (timing limitation, CSU) could be impacted by exploration and development where such activity occurs. Compared with Alternative A, the acreage decreases by 53,300 (11%); however, acres open to oil and gas leasing subject to the standard terms and conditions would decrease by 38%. The broader, surrounding landscape, however, would be altered by the changes in landform, vegetation removal, and placement of structures as described in Alternative A.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect the existing character of the landscape. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). On 133,900 acres (24%) open to oil and gas leasing subject to major constraints (NSO) and areas closed to oil and gas leasing, changes to the landscape would be prohibited by limitations on surface disturbance and occupancy. Compared with Alternative A, there would be a 53,300-acre increase in these acres (66% increase). Visual resources values in areas closed to mineral materials activities (78,500 acres, 14%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 9,500 acres, 2%, respectively) would be protected from changes in the landscape created by development of these minerals. In addition, excluding ROW development on 75,700 acres (14%) would eliminate the impacts noted from such development in Alternative A.

OHV Use and Route Designations

Implementing a recreational OHV system of designated routes throughout the decision area would limit landscape disturbance caused by OHVs. Designating small areas of previous disturbance as open to cross-country OHV use would not result in additional impacts from the removal of vegetation and exposure of soil.

Impacts from OHV use on designated routes would be the same as described in Alternative A, but would occur on 1,387 miles of designated routes on 524,000 acres (95%). The change from managing areas open to cross-country OHV use in Alternative A to limiting OHV use to designated routes under Alternative B would decrease impacts from OHV use throughout most of the decision area. Scenic quality on 28,900 acres (5%) of the decision area closed to OHV use would be protected from the impacts of motorized use. Over the long term, routes closed to OHV use would become obscured as vegetation extends into the route.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Pinyon-juniper woodlands are naturally interspersed with openings of shrubs and grasslands. Over time, pinyon and juniper trees invade these grasslands. Wildfire once maintained these natural openings. Using a variety of treatments to reduce this encroachment would create openings in large expanses of pinyon-juniper woodlands. Focusing on reducing the encroachment of pinyon-juniper woodlands would create natural openings in large expanses of pinyon-juniper woodlands. The treatments would create noticeable lines along edges, changes in color, and changes in texture between the woodlands and grasslands. These contrasts would create variety and interest in an otherwise monotonous landscape, enhancing the scenic quality as described in Alternative A.

Alternative C

Visual Resource Management Classes

Under Alternative C, there would be a reduction of 146,900 acres (28% decrease) from areas inventoried as VRM Classes II, III, and IV to managing the areas as VRM Class I, preserving the existing landscape characteristics (Table 4-10). The additional 146,900 acres would be managed by Class I objectives to protect the landscapes and scenic values associated with WC areas, some SRMAs and ACECs, all suitable WSR “wild” segments, and WSAs. There are some areas in the general area of a reasonably foreseeable surface coal mine that could result in short-term loss of visual character. Although most of the area surrounding the town of Alton was VRM Class IV in the inventory, there are small areas of VRM Class III and Class II. Under Alternative C, development of the coal mine would result in direct conflicts with the Class III and Class II management objectives while development activity occurs. Following 3 years of mineral extraction, areas would begin to be mitigated, but conflicts with the VRM management objectives in this location would continue for several years until mitigation and rehabilitation resulted in a landscape similar to the adjacent, undisturbed landscapes.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Impacts on landscapes and visual resources from mineral exploration and development, development within ROWs (e.g., powerlines, pipelines, and communication lines and towers), and wind and solar energy development would be the same as described in Alternative A.

Visual resource values on 298,300 acres (54%) that would be open to oil and gas leasing subject to the standard terms and conditions or open to oil and gas leasing subject to moderate constraints (timing limitation, CSU) could be impacted by exploration and development where such activity occurs. Compared with Alternative A, the acreage would decrease by 175,100 acres; however, acres open to oil

and gas leasing subject to the standard terms and conditions would decrease by 393,800 acres. The broader, surrounding landscape, however, would be altered by the changes in landform, vegetation removal, and placement of structures described in Alternative A.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (32,700 acres, 31%) would protect the existing character of the landscape. Such decisions include restrictions on uses of fish and wildlife and special status speces habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). On 255,700 acres (46%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing, changes to the landscape would be prohibited by limitations on surface disturbance and occupancy. Compared with Alternative A, there would be a 175,100-acre increase in these acres. Visual resources values in areas closed to mineral materials activities (175,000 acres, 32%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 158,800 acres, 29%, respectively) would be protected from changes in the landscape created by development of these minerals. In addition, excluding ROW development on 255,200 acres (46%) would eliminate the impacts noted from such development in Alternative A.

OHV Use and Route Designations

Impacts from OHV use on designated routes would be the same as described in Alternative A, but would occur on 1,190 miles of designated routes on 388,300 acres (70%). The change from managing areas open to cross-country OHV use in Alternative A to limiting OHV use to designated routes under Alternative C would decrease impacts from OHV use throughout most of the decision area. Scenic quality on 165,700 acres of the decision area closed to OHV use (30%) would be protected from the impacts of motor vehicle use.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Focusing on using vegetation treatment methods that use or mimic natural processes would reduce the short-term impacts in visual quality associated with the treatments. More acres would be impacted by fire-related treatments.

Alternative D

Visual Resource Management Classes

Under Alternative D more than twice as many acres would be managed to preserve their existing landscape characteristics (Class I management objectives) as the number of acres inventoried as Class I (Table 4-10). The areas that would be managed under Class I objectives generally were inventoried as Class II. Managing these areas under Class I objectives would preserve the existing landscape character in WSAs. Many areas managed as Class II in Alternatives A and B would be managed as Class III, specifically around the White Cliffs area north of U.S. Highway 89 and south of Alton. This shift in management direction would result from prescriptions aimed at allowing vegetation treatments in areas heavily encroached by pinyon-juniper woodlands.

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Impacts on landscapes and visual resources from mineral exploration and development, development within ROWs (e.g., powerlines, pipelines, and communication lines and towers), and wind and solar energy development would be the same as described in Alternative A.

Visual resource values on 455,900 acres (82%) that would be open to oil and gas leasing subject to the standard terms and conditions or open to oil and gas leasing subject to moderate constraints (timing

limitation, CSU) could be impacted by exploration and development where such activity occurs. Compared with Alternative A, the acreage would decrease by 17,500 acres (4% decrease). The broader, surrounding landscape, however, would be altered by the changes in landform, vegetation removal, and placement of structures described in Alternative A.

Management that Restricts Surface Disturbing Activities

Areas that are closed to surface disturbing activities (19,700 acres, 4%) would protect the existing character of the landscape. Such decisions include restrictions on uses of fish and wildlife and special status species habitat, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). On 98,100 acres (18%) open to oil and gas leasing subject to major constraints (NSO) and closed to oil and gas leasing, changes to the landscape would be prohibited by limitations on surface disturbance and occupancy. Compared with Alternative A, there would be a 17,500-acre (22%) increase in the number of acres. Visual resources values in areas closed to mineral materials activities (21,200 acres, 4%) or withdrawn and recommended for withdrawal from minerals entry (24,591 acres, 4%, and 7 acres, <1%, respectively) would be protected from changes in the landscape created by development of these minerals. In addition, excluding ROW development on 75,200 acres (14%) would eliminate the impacts noted from such development in Alternative A.

OHV Use and Route Designations

Impacts from cross-country OHV use would be the same as described in Alternative B, except that slightly more area would be open for such use. Because the landscapes of the areas open for cross-country OHV use are regularly disturbed, either naturally or by man, there would be no visual changes by allowing cross-country OHV use.

Impacts from OHV use on designated routes would be the same as described in Alternative A, but would occur on 1,464 miles of designated routes on 525,300 acres (95%). The change from managing areas open to cross-country OHV use in Alternative A to limiting OHV use to designated routes under Alternative D would decrease impacts from OHV use throughout most of the decision area. Scenic quality on 27,600 acres (5%) of the decision area closed to OHV use would be protected from the impacts of motor vehicle use.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Impacts from actions that change vegetation would be the same as described in Alternative B.

Summary

All of the alternatives would impact visual resources in varying degrees. Decisions that result in surface disturbance would have direct impacts on scenic quality by changing existing landscape characteristics. Similarly, decisions that reduce surface disturbance generally would decrease changes to the landscape or preserve scenic quality.

Although areas available for mineral development vary by alternative, development of all minerals is anticipated to disturb 8,426 acres (Appendix I) in every alternative. Any areas within the viewshed of the disturbances would be affected, reducing visual quality over larger areas. The complete magnitude of this impact would vary depending on the topography, vegetation, size of disturbance, and any mitigation actions that could be applied to reduce visual impacts.

Areas subject to vegetation treatments would add vegetation variety and contrast to the landscape, increasing interest and variety in form, line, color, and texture. In the short term, this would create direct visual changes to the landscape. Over the long term, restoration and vegetation treatments designed to

improve ecological conditions would create a mosaic in vegetation pattern that would increase visual variety and interest and improve scenic quality. Although all alternatives would result in vegetation treatments, Alternatives B, C, and D could treat the most acres. Visual impacts from vegetation treatments likely would be greatest under Alternative C because it requires a minimum level of treatment, while Alternatives B and D only set an upper limit of acres that can be treated.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources. Surface disturbing actions and those that affect vegetation would result in various short-term effects, such as decreased visual resource quality associated with development actions on the landscape. Surface disturbing activities, including mineral and energy development (e.g., coal, oil and gas, hard rock), infrastructure development (e.g., livestock waters, wildlife guzzlers, recreation sites, powerlines, communication sites) and human use would have the greatest potential for short-term uses affecting the long-term landscape character. Construction of roads, well pads, and other transportation infrastructure improvements could impair important visual elements, particularly if these developments occurred in areas of high visual sensitivity (i.e., near communities or areas of high recreation use). Many of these visual intrusions likely would affect the visual resources over the life of this plan.

4.2.11 Impacts on Non-WSA Lands with Wilderness Characteristics

This section addresses impacts on non-WSA lands with wilderness characteristics (WC areas), which have been identified by the BLM as having wilderness characteristics (i.e., appearance of naturalness and outstanding opportunities for primitive recreation or solitude). Impacts could include actions that maintain, protect, or improve wilderness characteristics or actions that result in the complete or partial loss of these characteristics. Within each WC area a number of variables determine the magnitude and intensity of impacts. These variables include the size and configuration of the area, topography, vegetation type, sequence of development, and reclamation time.

Management actions that could impact an area's natural appearance could include managing for the presence or absence of roads and trails, use of motorized vehicles along those roads and trails, fences and other improvements, the nature and extent of landscape modifications, the presence/or lack of native vegetation communities, the connectivity of wildlife habitats, or other actions that result in or preclude surface disturbing activities. All these activities affect the presence or absence of human activity and, therefore, could affect an area's natural appearance.

Two other wilderness characteristics (i.e., outstanding opportunities for solitude or primitive, unconfined types of recreation) are related to the human experience in an area. Visitors may have outstanding opportunities for solitude or for primitive and unconfined recreation when the sights, sounds, and evidence of other people are rare or infrequent; where visitors can be isolated, alone, or secluded from others; where the use of the area is through non-motorized, non-mechanical means; and where no or minimal developed recreation facilities are encountered. Impacts are quantified where possible; however, the lack of project-specific locations results in impacts often being identified qualitatively. In the absence of quantitative data, best professional judgment was used.

The analysis is based on the following assumptions:

- Surface disturbances related to mineral exploration and development identified in the RFD (Appendix I) would occur within the decision area.
- Seismic operations would occur uniformly throughout the decision area.
- Because WC areas comprise approximately 16 percent of the decision area, approximately 16 percent of the 906 acres (150 acres) of disturbance associated with oil and gas exploration (Appendix I) would occur on WC areas (Alternatives A, B, and D).
- Exploration wells would be developed uniformly throughout the area with high oil and gas development potential.
- Because WC areas comprise approximately 27 percent of areas with high oil and gas development potential, approximately 27 percent of the 32 exploration wells (approximately 9 wells) anticipated in areas with high oil and gas development potential would occur within WC areas. With approximately 23 acres of disturbance per well (Appendix I), development of 9 exploration wells would result in disturbance of approximately 210 acres of WC areas (Alternatives A, B, and D).

Under all alternatives, impacts on WC areas are not anticipated as a result of implementing management actions for the following resources and designations: air quality, wilderness, WSAs, and other designations.

Impacts Common to All Alternatives

Wildland Fire and Suppression

WC areas are affected by a variety of influences. Environmental actions, including changes to vegetation communities and the resulting modification of fire's role and regime, have resulted in an existing environment much different from the historical condition. Likewise, a variety of political and regulatory management constraints associated with other resource needs and safety considerations affect how the role of fire or non-fire fuels management can be applied within these areas.

The goals of the wildland fire ecology program would be to allow wildland fire to function in its natural ecological role, mirroring the historical fire return interval and severity. Recognizing that vegetation conditions and fuel loading within these lands are not in a historically natural condition, fire would still be considered a natural, but managed, component within these areas. Management of fire in its natural role within these areas would be implemented through a variety of control strategies associated with naturally ignited wildland fires and through planned prescribed fires. Planned projects would each undergo a site-specific environmental evaluation to determine the potential impacts on the resource prior to being approved.

The application of AMRs to naturally ignited wildland fires to accomplish specific resource management objectives may be identified in predefined designated portions of these areas. Full suppression of wildland fires in these areas may be implemented to control fire size and severity. Likewise, managing naturally ignited fires may occur as appropriate for letting fire play its natural role. Although minimized by following the resource protection measures, short-term impacts on naturalness resulting from management response to wildland fire efforts may still include ground disturbances associated with suppression efforts. ESR actions may be prioritized within these areas to stabilize wildfire areas, to minimize the threat of invasive and noxious weed species becoming established, and to preserve the natural and unique values inherent to them. The use of prescribed fire and non-fire treatments as a method to manage hazardous fuels and undesired vegetation cover may be implemented as well. Short-term impacts on naturalness would be similar to fire suppression and ESR actions.

Opportunities for solitude and primitive and unconfined recreation may be restricted (e.g., access) or impaired (e.g., visibility) during all of these naturally ignited and planned fire events. However, these impacts on the quality of visitor experience would be limited to the fire area and duration, and likely would not affect overall use and wilderness characteristics outside of the fire area.

Over the long term, the wildland fire ecology decisions would result in modification of the current condition to a condition that would be more representative of the pre-European settlement vegetation cover. Long-term effects associated with the application of AMRs to fires and planned actions (movement toward natural fire regime and reduced severity of fire events) would outweigh any short-term loss of naturalness, access, and quality of experience impacts associated with opportunities for solitude and primitive and unconfined recreation. By implementing the proposed fire management goals of reducing hazardous fuels to restore natural ecosystems and allowing fire to function in its natural ecological role, natural conditions and the array of supplemental values contained within these management areas would be enhanced and preserved. Likewise, visitor experience and opportunities for solitude and primitive and unconfined recreation may be enhanced by restoration of the historical natural condition.

Livestock Grazing

Maintenance and construction of range improvements could result in short-term loss of opportunities for solitude during implementation and a long-term decrease in naturalness; however, due to the small size and localized nature of most non-vegetation manipulation range improvements, this would not eliminate

naturalness throughout WC areas. Using livestock grazing to enhance the ecosystem health and/or help accomplish resource objectives, such as noxious and invasive weed control and hazardous fuel reduction, could impact the naturalness of these areas in the short term.

Other Management Actions

Short-term impacts on WC areas could be associated with cultural and paleontological inventories. During the survey and/or inventory there would be a loss of solitude, and during and following excavation there would be a loss of naturalness due to excavation activities. However, the number and size of these activities and, therefore, the related impact would be very low.

Alternative A

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Mineral exploration and development occurring within WC areas would impact both the naturalness and opportunities for solitude and primitive recreation from surface disturbance associated with development. Naturalness would be impacted primarily from increases in visual intrusions, human activity, and modifications to the landscape. Increased noise levels, visual impacts, presence of other people, and associated vehicular travel would impact opportunities for solitude and primitive recreation. The noise, people, vehicles, and equipment present during exploration for and development of mineral resources would eliminate opportunities for solitude and primitive recreation near the activity. Depending on the location of the well pads and roads, the terrain, vegetation, and atmospheric conditions impacts resulting from mineral exploration and development would reduce the opportunities for solitude and primitive recreation to less than outstanding in all or a substantial portion of the various WC areas. Naturalness could also be lost indirectly throughout the WC areas open for oil and gas leasing if direct impacts involve multiple road networks and wells. The quality of the opportunity for solitude and primitive recreation could also be compromised. When development is completed, opportunities for solitude and primitive recreation could return. However, productive wells would remain in place and would be substantially noticeable until the wells are decommissioned and disturbance is reclaimed, eliminating naturalness for the life of the well. Restoration activities would reduce the loss of naturalness from surface disturbing activities, especially on exploration wells that would be rehabilitated and revegetated within 2–5 years. Site-specific soil types and climatic variations would be major determinants in the length of time and success of reclamation.

Table 4-11 identifies the acres of oil and gas leasing stipulations by each WC area. Oil and gas exploration could reduce naturalness and opportunities for solitude on 150 acres of WC areas. Over the long term, these areas would be reclaimed and there would be no loss of wilderness characteristics. Within this alternative there would be no long-term loss of naturalness or outstanding opportunities for solitude or primitive recreation from oil and gas development on 1,130 acres (1% of WC areas) open to oil and gas leasing subject to major constraints (NSO). Although exploration could occur throughout these acres, NSO stipulations would protect naturalness from oil and gas development. Although 99 percent of the WC areas would be open for mineral leasing subject to the standard terms and conditions or subject to moderate constraints, the RFD and analysis assumptions projects no more than 210 acres of direct disturbance due to development of exploration wells. An additional 460 acres could be disturbed if the one very small field is developed on WC areas. Based on this development, wilderness characteristics could be directly eliminated on less than one percent of WC areas. However, naturalness and opportunities for solitude could be impacted beyond these 670 acres, depending on topographic and vegetation characteristics surrounding the wells. Over the long term, because most of the wells (32 of 52 wells in high-potential area) would be exploratory, continued loss of naturalness would not occur and reclamation would restore the natural conditions.

Table 4-11. Alternative A Acres of Oil and Gas Leasing Stipulations within WC Areas

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	5,500	79%	1,500	21%	0	0%	0	0%
Carcass Canyon	220	100%	0	0%	0	0%	0	0%
East of Bryce	860	100%	0	0%	0	0%	0	0%
Moquith Mountain	10,900	100%	0	0%	0	0%	0	0%
Orderville Canyon	0	0%	1,800	67%	900	33%	0	0%
Paria/Pine Hollow	770	86%	0	0%	130	14%	0	0%
Parunuweap Canyon	3,500	61%	2,100	37%	100	2%	0	0%
Upper Kanab Creek	43,400	100%	200	0%	0	0%	0	0%
Vermilion Cliffs	11,100	100%	0	0%	0	0%	0	0%
Wide Hollow	6,800	100%	0	0%	0	0%	0	0%
Total	**83,050**	**93%**	**5,600**	**6%**	**1,130**	**1%**	**0**	**0%**

Notes: 1- Percent of WC area.

All WC areas are open to mineral material disposal and are not recommended for withdrawal from mineral location. If development were to occur within these areas, impacts would be similar to those noted for oil and gas above, resulting in the loss of naturalness, solitude, and opportunities for primitive recreation. The development potential for these minerals is moderate or low in WC areas, and the potential for impact would be low.

Development of ROWs in WC areas would remove opportunities for solitude and primitive recreation during construction. The surface disturbance associated with the development would eliminate naturalness in that area. Following construction activities, naturalness would remain impacted for above-ground facilities, while reclamation of subsurface ROWs would reduce the loss of naturalness.

Management that Restricts Surface Disturbing Activities

Approximately 610 acres of WC areas overlap with portions of corridors of five eligible WSRs. Management that protects the tentative classification and ORVs within these corridors also would protect most of the wilderness characteristics.

Motorized Use of Routes

As OHV recreation continues to increase, managing 98 percent (87,680 acres) of WC areas as open to cross-country OHV use could result in the short-term elimination of most wilderness characteristics in many of these areas. The presence and noise of OHVs along the 107 miles of inventoried, non-designated routes within WC areas and cross-county use in these areas would temporarily eliminate opportunities for solitude and primitive recreation for the duration the OHV recreation use occurs in the area. In addition, surface disturbance from cross-country use could result in a loss of naturalness from vegetation and soil disturbance. These losses could be short term in areas where cross-country OHV use occurs infrequently or where disturbance is natural (e.g., sand dunes), allowing areas to naturally rehabilitate. However, non-sand dune areas receive concentrated cross-country OHV use, and long-term loss of natural appearance would occur with the creation of new routes and loss of vegetation. Limiting OHV use to designated routes on 11 percent (1,200 acres) of the Moquith Mountain WC area and 8 percent (900 acres) of the

Vermilion Cliffs WC area would eliminate OHV impacts in these areas because there are no routes designated for OHV use.

Visual Resources Management

Approximately 29,330 acres of WC areas would be managed as VRM Class II, which would keep the level of landscape change low, protecting the naturalness of 33 percent of WC areas. Impacts on the naturalness of these areas would be limited because of restrictions that require development activities to retain the existing character of the landscape. However, some visual intrusions would be allowed, which could affect the naturalness of the landscape. Naturalness would not be protected if visually intrusive activities occurred on 51,570 acres of WC areas in areas managed as VRM Class III and Class IV (Table 4-12). Disturbances and/or developments in these could introduce unnatural-looking visual intrusions, reducing the naturalness at a site-specific and landscape level.

Table 4-12. Alternative A VRM Class of Non-WSA Lands with Wilderness Characteristics

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	0	0%	730	10%	270	4%	6,000	86%
Carcass Canyon[2]	0	0%	0	0%	0	0%	0	0%
East of Bryce[3]	0	0%	0	0%	0	0%	0	0%
Moquith Mountain	0	0%	6,700	61%	200	2%	4,000	37%
Orderville Canyon	0	0%	2,700	100%	0	0%	0	0%
Paria/Pine Hollow[4]	0	0%	0	0%	0	0%	0	0%
Parunuweap Canyon	0	0%	300	5%	0	0%	5,400	95%
Upper Kanab Creek[5]	0	0%	15,600	36%	3,700	8%	24,200	56%
Vermilion Cliffs	0	0%	3,300	30%	800	7%	7,000	63%
Wide Hollow[6]	0	0%	0	0%	0	0%	0	0%
Total	**0**	**0%**	**29,330**	**33%**	**4,970**	**6%**	**46,600**	**52%**

Notes:
1- Percent of WC area.
2- There are 220 acres for which there is no existing/known VRM classification.
3- There are 860 acres for which there is no existing/known VRM classification.
4- There are 900 acres for which there is no existing/known VRM classification.
5- There are 100 acres for which there is no existing/known VRM classification.
6- There are 6,800 acres for which there is no existing/known VRM classification.

Recreation Use

Impacts from recreational OHV use are discussed under the "Motorized Use of Routes" header above. High concentrations of recreation users (large group sizes and/or frequent group encounters) in WC areas could decrease outstanding opportunities for solitude. However, most of the WC areas would not receive consistent concentrated recreation use. Early research proposed that solitude is impacted mainly by increasing number of inter-group contacts and not by the number within a user's own group (Watson et al. 1998). More recent research has shown that the loss of solitude is not explained by the mere presence of others, but by the behavior of other groups conflicting with expectations of user behavior (Watson 2001). For example, interaction between OHV users and hikers in a wilderness setting could create a greater loss of solitude for the hikers due to expectations placed on what activities they anticipated on seeing while hiking that day or for the uses they personally deem "appropriate" for that area. Likewise, the differences

in general recreation goals between day-users (less concerned about solitude, more interested in scenic beauty) and multi-day users (more concerned with the "purer" wilderness experience) could create conflicts based on only the expectations being sought by the individual recreationists (Cole 2001). Concerns about solitude and the number of groups encountered appear to be more important in more lightly used portions of wilderness, but are less helpful for setting use limits where use is heavy (Cole 2001). In general, the loss of solitude has been associated more with the behavior of other wilderness users, whether actually witnessed by others or interpreted through evidence of natural impacts, and the degree to which that behavior is beyond that expected (Freimund and Cole 2001).

Continued increases in non-motorized recreation users accessing Zion National Park through the North Fork Virgin River WSA could reduce opportunities for solitude in the Orderville Canyon WC area. In addition, large numbers of recreationists, especially in the narrow canyons associated with much of the canyon topography of the area, would increase the impacts on primitive/dispersed campsites, decreasing the naturalness in specific locations. Increasing use of primitive/dispersed campsites would result in increased areas of compacted soils, reducing vegetation and creating unnatural openings in the vegetation. Human waste and trash also would increase, especially when primitive/dispersed campsites are located in confined areas such as canyons. Due to low levels of recreation use throughout the other WC areas, impacts on solitude from the presence of high concentrations of recreationists would not be likely.

Use of wheeled game carriers or mountain bikes in WC areas could impact short-term naturalness and opportunities for primitive recreation. When the wheeled game carriers or bikes are no longer in sight, the impacts on solitude and primitive recreation would end, but the presence of the carrier's tracks would impact naturalness until natural processes reclaim the track. However, impacts from the tracks would be substantially unnoticeable across each WC area. The use of non-motorized wheeled game carriers would be limited because hunters could drive their OHVs cross-country to retrieve their harvest.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

One of the factors related to opportunities for solitude is the presence of vegetation to provide screening. Healthy upland and riparian/wetland areas provide vegetation screening, improving opportunities for solitude. Decisions associated with soils, fish and wildlife, livestock grazing, vegetation, and wildland fire ecology that result in direct changes to vegetation—whether intended to enhance, protect, and restore habitat; reduce soil erosion; increase livestock forage; or restore ecological functions—could be implemented in portions of WC areas. Solitude and naturalness could experience short-term losses while work was being conducted due to the sights and sounds associated with the vegetation treatments and from the evidence of other people assisting in management activities. Long-term impacts would depend on the size and scope of the project.

Most vegetation treatments likely would occur in areas with invaded pinyon-juniper woodlands. Vegetation treatments in these areas could result in stumps, evidence of disturbed vegetation, or unnatural-looking edge patterns, reducing the short-term appearance of naturalness. Over the long term, these impacts would be rehabilitated and become unnoticeable. In addition, the change of vegetation from woodland to grassland or shrubland would help restore these areas to a more pre-settlement condition. However, the change could also reduce tall vegetation that is conducive to screening, decreasing opportunities for solitude and primitive recreation. The limited nature of the proposed treatments, compared to the existing vegetation condition, would result in improved screening from more acres and more mature stands of pinyon-juniper woodlands.

Allowing harvesting of woodland products could impact WC areas by detracting from the natural character of the area and impacting opportunities for solitude. Impacts on natural character would be similar to the impacts from vegetation treatments noted above.

Land Tenure Adjustments

Not providing for the disposal of WC areas through FLPMA Section 203 sales would reduce the potential for the loss of some wilderness characteristics on these lands. While retaining the areas would not ensure protection of wilderness characteristics, it could result in the consideration of these values in future decision-making.

Livestock Grazing

Livestock grazing could have a perceived impact on WC areas. Areas frequented by livestock, such as springs or water developments, could have a perceived unnatural appearance to some wilderness users and reduce the quality of primitive recreation opportunities. It is important to note that the steep canyon topography in some of the WC areas makes livestock access difficult. While recreational use is commonly concentrated in the canyons, livestock use is generally outside of these areas, reducing potential impacts. In addition, forage allocations in the Zion Park Allotment (0 AUMs for livestock grazing) would eliminate the potential for livestock grazing impacts on portions of the Orderville Canyon WC area.

Other Management Actions

Extensive seed collection on WC areas could result in short-term impacts on naturalness from soil disturbance and the loss of opportunities for solitude during collection.

Alternative B

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

The general impacts from oil and gas exploration and development would be the same as Alternative A; however, the magnitude would vary based on the acres of oil and gas leasing stipulations by each WC area (Table 4-13). Oil and gas exploration could reduce naturalness and opportunities for solitude on 150 acres of WC areas. Wilderness characteristics would be protected from oil and gas development on 17,320 acres (19% of WC areas) closed to leasing or open to leasing subject to major constraints (Table 4-13). Although 16,190 fewer acres of WC areas (18% decrease compared to Alternative A) would be open to oil and gas leasing subject to the standard terms and conditions or subject to moderate constraints, the RFD still estimates no more than 670 acres of disturbance from oil and gas development on WC areas throughout the decision area. If the 670 acres of surface disturbance all occurred on the 72,460 acres of WC areas open to leasing subject to the standard terms and conditions or subject to moderate constraints, wilderness characteristics would be directly eliminated on less than 1 percent of these areas. However, naturalness and opportunities for solitude could be impacted beyond these 670 acres, depending on topographic and vegetation characteristics surrounding the wells and roads. Naturalness could also be lost indirectly throughout the WC areas open for oil and gas leasing if direct impacts involve multiple road networks and wells. Over the long term, because most of the wells (32 of 52 wells in high-potential area) would be exploratory, continued loss of naturalness would not occur and reclamation would generally restore the natural-looking conditions.

Table 4-13. Alternative B Acres of Oil and Gas Leasing Stipulations within WC Areas

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	4,500	64%	2,500	36%	0	0%	0	0%
Carcass Canyon	220	100%	0	0%	0	0%	0	0%
East of Bryce	840	98%	0	0%	20	2%	0	0%

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Moquith Mountain	5,000	46%	600	6%	5,300	49%	0	0%
Orderville Canyon	0	0%	2,400	89%	0	0%	300	11%
Paria/Pine Hollow	550	61%	350	39%	0	0%	0	0%
Parunuweap Canyon	500	9%	5,200	91%	0	0%	0	0%
Upper Kanab Creek	37,700	86%	4,700	11%	1,200	3%	0	0%
Vermilion Cliffs	1,300	12%	0	0%	9,800	88%	0	0%
Wide Hollow	0	0%	6,100	90%	700	10%	0	0%
Total	**50,610**	**56%**	**21,850**	**24%**	**17,020**	**19%**	**300**	**0%**

Notes: 1- Percent of WC area.

Impacts from location and development of mineral materials and locatable minerals would be the same as Alternative A for all WC areas except the Moquith Mountain, Orderville Canyon, and Upper Kanab Creek WC areas. In these areas, 1,200 acres, 320 acres, and 890 acres, respectively, would be closed to mineral material disposal and recommended for withdrawal from mineral entry. Throughout the remainder of these areas impacts would be the same as Alternative A. The development potential for these minerals is generally moderate or low in all WC areas, and the potential for impact would be low.

Development of ROWs in WC areas would remove opportunities for solitude and primitive recreation during construction. The surface disturbance associated with the development would eliminate naturalness in these areas. Following construction activities, naturalness would remain impacted for above-ground facilities, while reclamation of subsurface ROWs would reduce the loss of naturalness. Restrictions and guidelines placed on ROWs and ROW corridors would restrict activities that could impact the East of Bryce (20 acres as ROW avoidance area), Moquith Mountain (1,200 acres excluded from wind and solar ROWs), Parunuweap Canyon (100 acres seasonally closed to ROW development), and Upper Kanab Creek (3,800 acres seasonally closed to ROW development) WC areas. However, none of these restrictions would preclude ROW placement, so ROW development could result in the loss of wilderness characteristics on portions of all the WC areas.

Management that Restricts Surface Disturbing Activities

Management decisions that restrict surface disturbance in WC areas also would indirectly protect those characteristics. Such decisions include restrictions on uses of fish and wildlife habitat, ACECs, WSRs, and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). Specifically, 1,200 acres of the Moquith Mountain WC area overlap the Cottonwood Canyon ACEC and 5,100 acres overlap the Moquith Mountain and Kanab Community SRMAs, receiving indirect protection from the management for these areas. Approximately 9,600 acres of the Vermilion Cliffs WC area overlap the Kanab Community SRMA; the Non-Motorized RMZ also receives indirect protection for some wilderness characteristics. In addition, approximately 310 acres of the Orderville Canyon WC area overlaps the corridors of two suitable WSRs. Management that protects the tentative classification and ORVs within these corridors also would protect some of the wilderness characteristics.

Soil management actions that would result in reclaiming surface disturbances where appropriate, closing and reclaiming temporary roads associated with projects, and removing and reclaiming facilities or

improvements no longer necessary would reduce the amount of disturbance within WC areas. This would restore naturalness in these areas and improve opportunities for solitude and primitive recreation.

Motorized Use of Routes

Not designating any WC areas for cross-country OHV use would protect these areas from any long-term impacts from OHV use. Compared to Alternative A, the potential for soil and vegetation disturbance from cross-country OHV use would be eliminated by limiting OHV use to designated routes. Allowing motor vehicle use along 101 miles of routes within 89,480 acres of WC areas limited to designated routes could impact recreation users' perception of opportunities for solitude and primitive recreation. The appearance of naturalness would be temporarily reduced by any signs and barricades that may be needed to keep vehicles on existing routes. Such structures would be temporary, limited to the routes, and would not affect the whole WC area. In addition, the sound and presence of an increasing number of OHV users would reduce non-motorized recreation users' perception of opportunities for solitude and primitive recreation. When the OHV user passed beyond sight and hearing range, opportunities for solitude and primitive recreation would return and natural soundscapes would be restored. Limiting OHV recreation use to these designated routes would minimize disturbance of adjacent lands, protecting the natural character of areas adjacent to these routes. This use would not expand beyond these routes or impact the long-term naturalness of the WC areas. Closing 4 miles of routes in the Vermilion Cliffs WC area would eliminate all OHV impacts on wilderness characteristics in this WC area. Not allowing OHV use on 300 acres of the Orderville Canyon WC area also would eliminate OHV impacts in this area, although no inventoried route would be closed as a result.

Visual Resources Management

Approximately 310 acres of the Orderville Canyon WC area would be managed as VRM Class I (Table 4-14), which would preserve the naturalness and opportunity for solitude and primitive recreation. The level of landscape change would be low on 46,410 acres of WC areas managed as VRM Class II (17,080 acres, 58% increase compared to Alternative A). The naturalness of these areas would be protected because of restrictions that require development activities to retain the existing character of the landscape. Naturalness would not be protected if visually intrusive activities occurred on 43,060 acres (8,510 acres, 17% decrease compared to Alternative A) of the WC areas in VRM Class III and Class IV areas. Disturbances and/or developments in these areas could introduce unnatural-looking visual intrusions, reducing the naturalness at a site-specific and landscape level.

Table 4-14. Alternative B VRM Class of Non-WSA Lands with Wilderness Characteristics

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	0	0%	0	0%	3,800	54%	3,200	46%
Carcass Canyon	0	0%	0	0%	200	91%	20	9%
East of Bryce	0	0%	860	100%	0	0%	0	0%
Moquith Mountain	0	0%	7,200	66%	3,100	28%	600	6%
Orderville Canyon	310	11%	2,350	87%	40	1%	0	0%
Paria/Pine Hollow	0	0%	0	0%	0	0%	900	100%
Parunuweap Canyon	0	0%	1,100	19%	4,200	74%	400	7%
Upper Kanab Creek	0	0%	24,200	56%	13,900	32%	5,500	13%
Vermilion Cliffs	0	0%	10,700	96%	400	4%	0	0%
Wide Hollow	0	0%	0	0%	6,800	100%	0	0%

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Total	**310**	**0%**	**46,410**	**52%**	**32,440**	**36%**	**10,620**	**12%**

Notes: 1- Percent of WC area.

Recreation Use

Impacts from recreation use within WC areas would be the same as Alternative A, except limiting group sizes associated with SRPs within riparian areas and designated critical habitat to 12 people would help protect opportunities for solitude and primitive unconfined recreation. These impacts would be most evident in the areas currently receiving high levels of use, such as the Orderville Canyon WC area surrounding the North Fork Virgin River and Orderville Canyon WSAs. Throughout the remainder of the WC areas, in generally more open landscapes, limiting SRP group sizes to 25 would keep group sizes low while allowing users to be able to seek out opportunities for solitude. In addition to the reduction in the number of users, supporting education and outreach programs such as "Tread Lightly" and "Leave No Trace" would reduce impacts from increasing numbers of overnight users as campers recreate in a manner that leaves fewer impacts.

Impacts from the use of wheeled game carriers in WC areas would increase compared to Alternative A. Limiting OHV use to designated routes throughout the decision area could increase the use of wheeled game carriers away from the designated routes. However, this would decrease the overall impact compared to Alternative A because impacts from OHVs driving cross-country to the harvest would be eliminated.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

One of the factors related to opportunities for solitude is the presence of vegetation to provide screening. Healthy upland and riparian/wetland areas provide vegetation screening, improving opportunities for solitude. Maintaining and/or restoring riparian areas protects naturalness in these areas and improves vegetation screening to protect site-specific opportunities for solitude. Decisions associated with soil, water, fish and wildlife, livestock grazing, vegetation, wildland fire ecology, and special status species alternatives that result in direct changes to vegetation—whether intended to enhance, protect, and restore habitat; reduce soil erosion; increase livestock forage; or restore ecological functions—could be implemented in all WC areas. Solitude and naturalness could experience short-term losses while work was being conducted due to the sights and sounds associated with the vegetation treatments and from the evidence of other people assisting in management activities. Long-term impacts would depend on the size and scope of the project. Allowing up to 446,000 acres of treatment over the life of the plan would result in these impacts occurring within some of the WC areas.

Most vegetation treatments likely would occur in areas with invaded pinyon-juniper woodlands. Vegetation treatments in these areas could result in stumps, evidence of disturbed vegetation, or unnatural-looking edge patterns, reducing the short-term appearance of naturalness. Over the long term, these impacts would be rehabilitated and become unnoticeable. In addition, the change of vegetation from woodland to shrubland would help restore these areas to a more pre-settlement condition. However, the change could also reduce tall vegetation that is conducive to screening, decreasing opportunities for solitude and primitive recreation. Over the long term, allowing high levels of vegetation treatment would help maintain and/or enhance naturalness by bringing the fire regime condition class to a point that would allow fire to play its natural role in the ecosystem. However, not requiring treatments could result in further expansion of pinyon-juniper woodlands, improving screening and associated opportunities for

solitude, but decreasing naturalness because vegetation communities continue to be outside their natural disturbance regimes.

Allowing harvesting of woodland products could impact WC areas by detracting from the natural character of the area and impacting opportunities for solitude. Impacts on natural character would be similar to the impacts from vegetation treatments noted above.

Land Tenure Adjustments

Making approximately 220 acres of WC areas available for FLPMA Section 203 sale would result in a loss of opportunities for solitude and primitive recreation. This would include all of the Carcass Canyon WC area within the decision area. This WC area and the adjacent public lands that do not have wilderness characteristics are isolated from other public lands within the decision area. While disposal could result in a loss of opportunities, it would eliminate the need to manage these isolated tracts surrounded by non-public lands.

Livestock Grazing

Forage allocations in the Water Canyon Allotment (0 AUMs for livestock grazing) would eliminate the potential for livestock grazing impacts in portions of the Moquith Mountain WC area. In addition, while there would still be 0 AUMs allocated for livestock grazing in the Zion Park Allotment, forage identified in future studies would be allocated to livestock grazing, which could result in the same impacts as Alternative A in portions of the Orderville Canyon WC area.

Other Management Actions

Extensive seed collection and use of vegetative materials on WC areas could result in short-term impacts on naturalness from soil disturbance and in the loss of opportunities for solitude during collection.

Alternative C

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

Wilderness characteristics would be protected from mineral exploration and development on all WC areas (89,780 acres). This includes closures to oil and gas leasing (Table 4-15) and mineral material disposal, recommended for withdrawal from locatable mineral entry, and exclusion from ROW development. This would be a 100 percent decrease in acres open for leasing or mineral and ROW development compared to Alternative A. Because all WC areas would be closed to mineral development, the acres of disturbance associated with mineral development identified in the RFD (Appendix I) would not apply to WC areas.

Table 4-15. Alternative C Acres of Oil and Gas Leasing Stipulations within WC Areas

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	0	0%	0	0%	0	0%	7,000	100%
Carcass Canyon	0	0%	0	0%	0	0%	220	100%
East of Bryce	0	0%	0	0%	0	0%	860	100%
Moquith Mountain	0	0%	0	0%	0	0%	10,900	100%
Orderville Canyon	0	0%	0	0%	0	0%	2,700	100%
Paria/Pine Hollow	0	0%	0	0%	0	0%	900	100%

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Parunuweap Canyon	0	0%	0	0%	0	0%	5,700	100%
Upper Kanab Creek	0	0%	0	0%	0	0%	43,600	100%
Vermilion Cliffs	0	0%	0	0%	0	0%	11,100	100%
Wide Hollow	0	0%	0	0%	0	0%	6,800	100%
Total	**0**	**0%**	**0**	**0%**	**0**	**0%**	**89,780**	**100%**

Notes: 1- Percent of WC area.

Management that Restricts Surface Disturbing Activities

Management decisions that restrict all surface disturbing activities also would indirectly protect wilderness characteristics in WC areas. Such decisions include restrictions on uses of relict vegetation and areas that are sensitive to disturbance (e.g., riparian/wetland areas).

Soil management actions that would result in reclaiming surface disturbances where appropriate, closing and reclaiming temporary roads associated with projects, and removing and reclaiming facilities or improvements no longer necessary would reduce the amount of disturbance within WC areas. This would increase naturalness in these areas and improve opportunities for solitude and primitive recreation.

Motorized Use of Routes

Wilderness characteristics would be protected from any short-term or long-term impacts associated with OHV use on all WC areas (89,780 acres). All WC areas would be closed to OHV use and the 107 miles of inventoried routes would be closed to motorized use and allowed to be used by non-motorized users. This would be a 100 percent decrease in acres open to cross-country OHV use and miles of routes open for OHV use compared to Alternative A. This would protect the naturalness and opportunities for solitude and primitive recreation in these areas.

Visual Resources Management

The naturalness of all the WC areas (89,780 acres) would be preserved from visual intrusions due to managing all the areas as VRM Class I (Table 4-16). Managing these areas to preserve their landscapes either precludes visually obtrusive developments or activities or requires extensive mitigation so they are not visible.

Table 4-16. Alternative C VRM Class of Non-WSA Lands with Wilderness Characteristics

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	7,000	100%	0	0%	0	0%	0	0%
Carcass Canyon	220	100%	0	0%	0	0%	0	0%
East of Bryce	860	100%	0	0%	0	0%	0	0%
Moquith Mountain	10,900	100%	0	0%	0	0%	0	0%
Orderville Canyon	2,700	100%	0	0%	0	0%	0	0%
Paria/Pine Hollow	900	100%	0	0%	0	0%	0	0%

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Parunuweap Canyon	5,700	100%	0	0%	0	0%	0	0%
Upper Kanab Creek	43,600	100%	0	0%	0	0%	0	0%
Vermilion Cliffs	11,100	100%	0	0%	0	0%	0	0%
Wide Hollow	6,800	100%	0	0%	0	0%	0	0%
Total	**89,780**	**100%**	**0**	**0%**	**0**	**0%**	**0**	**0%**

Notes: 1- Percent of WC area.

Recreation Use

Impacts from recreation use within WC areas would decrease compared to Alternative B because SRP group sizes would be limited to eight within protected and restricted Mexican spotted owl habitat. Alternative C also increases protections on opportunities for solitude and primitive unconfined recreation (within the Orderville Canyon and western portions of the Parunuweap Canyon WC areas). However, reducing group size could also result in fewer primitive recreation opportunities for recreationists in these areas. Throughout the remainder of the WC areas, in generally more open landscapes, limiting SRP groups to 20 people per group would allow users to consistently find outstanding opportunities for solitude. There would be no impacts from the use of wheeled game carriers because there are no designated routes in WC areas.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Preferring vegetation treatments that mirror natural processes would reduce impacts on naturalness from stumps, evidence of disturbed vegetation, or treatments with unnatural-looking edges. The only short-term losses to solitude would be associated with personnel managing prescribed fires or monitoring natural fires. However, over the long term the natural character and functions of the WC areas could decrease because of the lack of opportunities to manage noxious and invasive species. By precluding some vegetation treatments, the ability to control and reduce some invasive plant species could be reduced, which could increase the spread of those noxious and invasive weeds, changing the natural vegetation communities.

Vegetation treatments on at least 4,650 acres annually would maintain the natural disturbance rates. This would result in the impacts noted above, but also it would reduce the number of acres with pinyon-juniper woodlands and the opportunities for solitude they provide due to their screening. Outstanding opportunities for solitude would remain, but the presence of other humans or activities would be more evident on the landscape.

Land Tenure Adjustments

Retaining all WC areas in public ownership would protect against any potential loss of wilderness characteristics following land tenure change. This would be a 100 percent decrease compared to Alternative B.

Livestock Grazing

Forage allocations in the Water Canyon and Lower North Fork Allotments (0 AUMs for livestock grazing) would eliminate the potential for livestock grazing impacts in portions of the Moquith Mountain and Orderville Canyon WC areas, respectively.

Other Management Actions

Precluding commercial seed collection and use of vegetative materials would eliminate the potential for short-term impacts on naturalness from soil disturbance and would preserve opportunities for solitude.

Alternative D

Planned (BLM) or Permitted (BLM-Approved) Surface Disturbing Actions

The general impacts from oil and gas exploration and development would be the same as Alternative A; however, the magnitude would vary based on the acres of oil and gas leasing stipulations by each WC area (Table 4-17). Oil and gas exploration could reduce naturalness and opportunities for solitude on 150 acres of WC areas. Wilderness characteristics would be protected from oil and gas development on 2,380 acres (3% of WC areas) open to leasing subject to major constraints. There would be a decrease of 1,250 acres (1% decrease) of WC areas open for mineral leasing subject to the standard terms and conditions or subject to moderate constraints (87,400 acres, 97% of WC areas) compared to Alternative A. However, surface disturbance associated with reasonably foreseeable oil and gas development would remain no more than 670 acres of disturbance from oil and gas development on WC areas throughout the decision area. If the 670 acres of surface disturbance all occurred on the 87,400 acres of WC areas open to leasing subject to the standard terms and conditions or subject to moderate constraints, wilderness characteristics would be directly eliminated on less than 1 percent of these areas. However, naturalness and opportunities for solitude could be impacted beyond these 670 acres, depending on topographic and vegetation characteristics surrounding the wells and roads. Naturalness could also be lost indirectly throughout the WC areas open for oil and gas leasing if direct impacts involve multiple road networks and wells. Over the long term, because most of the wells (32 of 52 wells in high-potential areas) would be exploratory, loss of naturalness would not occur and reclamation would restore the generally natural-looking conditions.

Table 4-17. Alternative D Acres of Oil and Gas Leasing Stipulations within WC Areas

WC Area Name	Open, Subject to Standard Terms & Conditions		Open Subject to Moderate Constraints		Open Subject to Major Constraints		Closed to Leasing	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	5,500	79%	1,500	21%	0	0%	0	0%
Carcass Canyon	220	100%	0	0%	0	0%	0	0%
East of Bryce	840	98%	0	0%	20	2%	0	0%
Moquith Mountain	9,000	83%	500	5%	1,400	13%	0	0%
Orderville Canyon	0	0%	2,700	100%	0	0%	0	0%
Paria/Pine Hollow	900	100%	0	0%	0	0%	0	0%
Parunuweap Canyon	3,600	63%	2,100	37%	0	0%	0	0%
Upper Kanab Creek	42,800	98%	500	1%	300	1%	0	0%
Vermilion Cliffs	11,000	99%	40	0%	60	1%	0	0%
Wide Hollow	6,200	91%	0	0%	600	9%	0	0%
Total	**80,060**	**89%**	**7,340**	**8%**	**2,380**	**3%**	**0**	**0%**

Notes: 1- Percent of WC area.

All WC areas are open to mineral material disposal and are not recommended for withdrawal from mineral location. If location and development were to occur within these areas, impacts would be similar to those noted for oil and gas above, resulting in the loss of naturalness, solitude, and opportunities for primitive recreation. The development potential for these minerals is generally moderate or low in all WC areas, and the potential for impact would be low.

Development of ROWs in WC areas would remove opportunities for solitude and primitive recreation during construction. The surface disturbance associated with the development would eliminate naturalness in these areas. Following construction activities, naturalness would remain impacted for above-ground facilities, while reclamation of subsurface ROWs would reduce the long-term loss of naturalness. ROW placement is not excluded from any WC area, so ROW development could impact portions of all the WC areas. Restrictions placed on ROWs and ROW corridors in the East of Bryce WC area (20 acres as ROW avoidance area) would limit the potential for ROW development impacts in this area.

Management that Restricts Surface Disturbing Activities

Management decisions that restrict surface disturbance in WC areas also would indirectly protect those characteristics. Such decisions include restrictions on uses of fish and wildlife habitat and areas that are sensitive to disturbance (e.g., fragile soils and riparian/wetland areas). Specifically, 1,200 acres of the Moquith Mountain WC area overlap the Moquith Mountain SRMA Non-Dunes Wooded RMZ, providing indirect protection from the management of this area's opportunities for primitive recreation and solitude.

Soil management actions that would result in reclaiming surface disturbances where appropriate, closing and reclaiming temporary roads associated with projects, and removing and reclaiming facilities or improvements no longer necessary would reduce the amount of disturbance within WC areas. This would increase naturalness in these areas and improve opportunities for solitude and primitive recreation.

Motorized Use of Routes

Impacts from OHV use of designated routes would slightly increase compared to Alternative B due to 4 miles of routes in the Vermilion Cliffs WC area being managed as open for OHV use. Impacts to wilderness characteristics from OHV use along these 4 miles of routes in the Vermilion Cliffs WC area would be the same as those described in Alternative A. For the remainder of the WC areas, impacts would be the same as Alternative B.

Visual Resources Management

Approximately 20,620 acres of WC areas would be managed as VRM Class II, which would keep the level of landscape change low, protecting the naturalness of 23 percent of WC areas (Table 4-18). This would be 8,710 fewer acres (30% decrease) than Alternative A, reducing the degree of indirect protection WC areas receive. No WC areas would be managed for VRM Class I. Naturalness would not be protected if visually intrusive activities occurred on 77 percent (69,160 acres) of WC areas managed as VRM Class III and Class IV. This would be the most acres managed in these categories compared to the other alternatives, with a 34 percent (17,590 acres) increase compared to Alternative A. Disturbances and/or developments in these areas could introduce unnatural-looking visual intrusions, reducing the naturalness at a site-specific and landscape level.

Table 4-18. Alternative D VRM Class of Non-WSA Lands with Wilderness Characteristics

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Canaan Mountain	0	0%	0	0%	3,800	54%	3,200	46%

WC Area Name	VRM Class I		VRM Class II		VRM Class III		VRM Class IV	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Carcass Canyon	0	0%	0	0%	0	0%	220	100%
East of Bryce	0	0%	860	100%	0	0%	0	0%
Moquith Mountain	0	0%	6,000	55%	4,300	39%	600	6%
Orderville Canyon	0	0%	2,660	99%	40	1%	0	0%
Paria/Pine Hollow	0	0%	0	0%	0	0%	900	100%
Parunuweap Canyon	0	0%	1,100	19%	4,200	74%	400	7%
Upper Kanab Creek	0	0%	900	2%	42,500	97%	200	0%
Vermilion Cliffs	0	0%	9,100	82%	1,900	17%	100	1%
Wide Hollow	0	0%	0	0%	6,100	90%	700	10%
Total	**0**	**0%**	**20,620**	**23%**	**62,840**	**70%**	**6,320**	**7%**

Notes: 1- Percent of WC area.

Recreation Use

Impacts from recreation use within WC areas would increase compared to Alternative B because group sizes associated with SRP within wetlands and designated critical habitat could be increased to 20, which could result in the temporary loss of opportunities for solitude or unconfined recreation for users from other groups. Long-term loss of naturalness associated with impacts on primitive/dispersed campsites due to increases in group sizes would be less than noted in Alternative A due to supporting education and outreach programs such as Tread Lightly and Leave No Trace, which would reduce impacts from increasing numbers of overnight users as campers recreate in a manner that leaves fewer impacts. Throughout the remainder of the WC areas, in generally more open landscapes, limiting SRP group sizes to 40 could result in the loss of opportunities for solitude within visual and auditory range of these groups. Where parties of this size camp and recreate, there would be a temporary loss of opportunities for solitude.

Limiting OHV use to designated routes throughout the decision area could increase the use of wheeled game carriers away from the designated routes.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Impacts from changes in vegetation would be the same as Alternative B.

Land Tenure Adjustments

Making approximately 2,230 acres of WC areas available for FLPMA Section 203 sale would result in a loss of opportunities for solitude and primitive recreation. This would decrease the acres of WC areas by nearly 3 percent. This would include all of the Carcass Canyon WC area within the decision area, and less than 10 percent of the Moquith Mountain (820 acres), Upper Kanab Creek (510 acres), and Wide Hollow (680 acres) WC areas. Many of these areas are small and isolated from other public lands within the decision area; disposal of acreages within the Upper Kanab Creek and Moquith Mountain areas also would eliminate larger areas nearly surrounded by state or private land. While disposal could result in a loss of opportunities, it would eliminate the need to manage these tracts that are mostly surrounded by non-public lands.

Livestock Grazing

Forage allocations in the Lower North Fork Allotment (0 AUMs for livestock grazing) would eliminate the potential for livestock grazing impacts in portions of the Orderville Canyon WC area.

Other Management Actions

Extensive seed collection and use of vegetative materials on WC areas could result in short-term impacts on naturalness from soil disturbance and in the loss of opportunities for solitude during collection.

Summary

There would be short-term impacts on WC areas under every alternative except Alternative C. Alternative A would provide the least amount of protection to WC areas, including management that could result in many short-term impacts and the potential for several long-term impacts. Continuing to allow cross-country OHV use while OHV registration and use continues to climb could result in a long-term loss of naturalness. All the other alternatives would either limit OHV use to designated routes, decreasing impacts from OHV use to short-term perceived loss of opportunities for solitude and primitive recreation (Alternatives B and D) or eliminating impacts from OHV use altogether (Alternative C).

Only Alternative C evaluates the potential impacts of closing all the WC areas to mineral leasing and the impacts from any oil and gas exploration and development. However, under Alternatives A, B, and D, where all acres of disturbance anticipated in the RFD are assumed to occur on WC areas, less than 1 percent of all WC areas would be directly impacted. The amount of acres affected by oil and gas development could increase depending on site-specific topographical and vegetative conditions and the ability to see and hear the development and function of oil and gas wells, but other management would affect the visibility of these developments.

Other than Alternative D, which manages only 23 percent of WC areas according to VRM Class II standards, no alternative manages less than 33 percent of these areas for little or no landscape changes. Alternative C provides the greatest protection of wilderness characteristics by designating 100 percent of WC areas as VRM Class I. Alternative B provides the next greatest amount of protection, managing 52 percent of these areas as VRM Class I or Class II.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

The loss of wilderness characteristics due to mineral development would be irreversible and irretrievable during the life of the plan. Beyond the life of this plan, however, naturalness and opportunities for primitive recreation and solitude could be restored in most cases. This impact indicates a trade-off between the potential short-term uses and long-term preservation of every acre that has been identified as a WC area. In balancing the multiple-use mandate, portions of these areas could be committed to other uses under Alternatives A, B, and D. Generational uses of public lands have demonstrated that opportunities for solitude, primitive recreation, and, over time, the naturalness of these lands might be restored. For example, the enjoyment of wilderness characteristics is now available in places elsewhere in the western United States where uranium mines were predominant during the Cold War era of the 20th century. Time, reclamation, and the absence of human activities have and can restore these attributes, although generally beyond the period this plan will be in effect.

There is a potential for unavoidable adverse impacts and subsequent loss of one or all of the wilderness characteristics on some WC areas under Alternatives A, B, and D. Due to the location of the WC areas and the development potential for minerals, the magnitude or acres affected would be small if

development occurs on these lands. Management associated with Alternative C would protect wilderness characteristics in all WC areas.

4.3 RESOURCE USES

4.3.1 Impacts on Forestry and Woodland Products

This analysis addresses potential impacts on forest and woodland products harvest from implementing the management actions under the alternatives described in Chapter 2. This analysis focuses on those management alternatives or actions that place limitations and/or affect the quantity or quality of products on the approximately 478,000 acres available for forest and woodland product harvest in the decision area, as discussed in Chapter 3. Impacts on forest and woodland health are discussed in Chapter 3. In the absence of quantitative data, best professional judgment was used, and impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

The analysis is based on the following assumptions:

- Several traditional woodland products (e.g., Christmas trees, posts, and poles) may be harvested from tree species growing on sites not classified as forest or woodland.
- Demand for forest and woodland products is not anticipated to grow substantially over the planning period; however, biomass utilization may increase in the future.
- Supply of forestry and woodland products would continue to substantially exceed demand.

Under all alternatives, impacts on forest and woodland products harvest would not be anticipated as a result of implementing management actions for the following resources and designations: air quality, livestock grazing, energy and minerals, recreation management, and lands and realty.

Impacts Common to All Alternatives

Forest and Woodland Harvest Management

Implementing a management plan for woodland and/or forest products would result in long-term increases in sustainability of forest and woodland product harvest.

Limits or Restrictions on Forest and Woodlands Harvest

Implementing BMPs to minimize detrimental impacts on soils and water quality from ground disturbing activities and maintaining and/or enhancing riparian areas through project design features and/or stipulations would place limitations on harvest and could possibly prevent harvest in these locations.

Surface disturbance restrictions intended to protect special status species and fish and wildlife, such as prohibiting ground disturbing activities within ½ mile of bald eagle nests and Mexican spotted owl nests, could restrict opportunities for product harvest in these areas.

Restrictions on surface disturbing activities near cultural and paleontological sites could prevent or restrict harvest of forest and woodland products.

Vegetation Management and Habitat Manipulation

Vegetation treatments designed to improve non-forest and woodland objectives, such as improving the ecological health of rangelands or eliminating noxious weeds and invasive species establishment, could increase the quantity and quality of products available for harvest. Over the long term, improving the ecological health of vegetation could increase the quality of forest products (Sonne and Briggs 2001, Prestemon et al. 2005).

Wildland Fire

Using wildland fire and prescribed fire to protect, maintain, and enhance resources would decrease the acres of woodlands available for harvest; however, rangeland health would be improved. Depending on the degree of severity, burned wood may or may not be useful. Suppressing wildland fires in areas where fire is not desired could increase the quantity of forest and woodland products. Fire suppression usually results in denser forest stands, increasing the risk of uncharacteristically larger or intense wildfires and mortality from insect pests and disease.

Alternative A

Forest and Woodland Harvest Management

Designated harvest areas would continue to facilitate product harvest. Commercial harvest of forest and woodland products would continue to be excluded in all wilderness areas and WSAs. Ponderosa pine removal would not be allowed during harvest, which would limit harvests of this species.

Limits or Restrictions on Harvest

The majority of impacts on forest and woodland product harvest would occur from surface disturbing restrictions that reduce the area where harvest is feasible. Restrictions on surface disturbance could alter the location, extent, or method of forest and woodland harvest. Under Alternative A, no surface disturbing actions would be allowed on 14,900 acres (3%), which would prevent harvest in these areas. The no surface disturbance restriction would be applied to bald eagle nest sites and occupied Utah prairie dog habitat.

Managing visual resources via VRM Class objectives would alter the location, extent, or method of forest and woodland harvest in VRM Class I and II areas. Alterations would be dependent on site-specific conditions and VRM Class objectives following a visual contrast rating analysis and other environmental review. Under Alternative A, 21,200 acres (4%) would be managed as VRM Class I and 99,900 acres (18%) would be managed as VRM Class II. VRM Class II areas would be avoided but may be used at a future date with appropriate stipulations incorporated to meet objectives.

Management prescriptions associated with ACECs could restrict surface uses, including harvests. Continuing to manage the Water Canyon/South Fork Indian Canyon ACEC (220 acres) as a VRM Class II area could alter the location, extent, or method of forest and woodland harvest in the ACEC.

Managing river segments as eligible for inclusion in the National Wild and Scenic Rivers System (NWSRS) could alter the location where forest and woodland product harvest can occur. Under Alternative A, all 15 eligible river segments and corridors (9,230 acres) would be protected and harvest would not be allowed in these areas.

Vegetation Management and Habitat Manipulation

Improvements to the ecological health of vegetation, wildlife habitat improvements, and some rangeland improvement projects could increase the quality of forest products available for harvest. Implementing vegetation treatments (mechanical, fire, biological, and chemical) and managing vegetation resources to meet desired vegetation conditions could reduce the short-term extent of this vegetation community by converting treated areas to a grass/shrub-dominated community. Over the long term, treatments likely would improve the productivity and health of woodland habitat.

Alternative B

Forest and Woodland Harvest Management

Permitting commercial forest and woodland product harvest for the purposes of promoting or sustaining forest health on a case-by-case basis would allow harvests to occur, but would limit the potential for commercial harvest because they would be used only for the purpose of promoting or sustaining forest health.

Permitting commercial and non-commercial harvest of green or dead pinyon and juniper woodland products (e.g., cedar posts, Christmas trees, fuelwood, and biomass utilization) areawide unless otherwise designated or stipulated and other woodland species on a case-by-case basis would facilitate woodland products harvest. Permitting harvest of woodland products in riparian areas in proper functioning condition on a case-by-case basis for the maintenance and/or improvement of riparian ecosystems would facilitate woodland products harvest.

Closing WSAs to woodland product harvest, except for incidental collection for onsite campfire use and administrative purposes, would preclude woodland products harvest in these areas.

Limits or Restrictions on Harvest

Additional restrictions would be applied to surface disturbing activities, which would reduce the areas available for harvest. No surface disturbing action would be allowed on 19,700 acres (4%), increasing the area not allowed for harvest. The no surface disturbance restriction would be applied to areas within ¼ mile or the visual horizon of cultural sites; within ½ mile of active bald eagle nest sites; within ½ mile of active, suitable, or potential reintroduction Utah prairie dog habitat/sites; and within 330 feet of riparian areas.

Controlling surface disturbing and disruptive activities to minimize impacts on identified crucial habitat for sensitive species, applying BMPs to avoid or reduce habitat fragmentation, and prohibiting surface disturbing activities within ½ mile of active or suitable prairie dog habitat would restrict the location, extent, or method of opportunities for product harvest in these areas.

VRM Class I areas would increase to 76,000 acres (14%) and VRM Class II areas would increase to 93,600 acres (17%). This would further alter the location, extent, or method of forest and woodland harvest and restrict harvest opportunities. Alterations would be dependent on site-specific conditions and VRM Class objectives following a visual contrast rating analysis and other environmental review.

The magnitude of impacts from management prescriptions associated with ACECs would increase compared to Alternative A, which would further restrict surface uses, including harvests. The area of ACECs managed as VRM Class II would increase to 3,800 acres with designation of the Cottonwood Canyon ACEC.

The magnitude of impacts from WSR management actions would decrease compared to Alternative A, which could further alter the location where harvests can occur. Only seven eligible river segments and corridors (6,310 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Vegetation Management and Habitat Manipulation

Vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, livestock rangeland treatments, fuels treatments, and stewardship contracting) on an annual average of no more than 22,300 acres (446,000 acres over the life of the plan) using the full range of vegetation treatment methods and

tools (i.e., prescribed fire, mechanical, chemical, biological, woodland product removal, and wildland fire use) could reduce the extent of pinyon-juniper within the sagebrush steppe communities by converting treated areas to a grass/shrub-dominated community. Over the long term, treatments likely would decrease pinyon-juniper cover, but improve the productivity and health of existing stands. Based on recent woodland product demand, decreases in woodland cover would not affect the availability of woodland products.

Vegetation resources would be managed to achieve 51 percent or higher of the PNC, which would create a target for rehabilitation efforts that could increase the extent of successfully rehabilitated areas. Treatments would be allowed in areas containing ponderosa pine trees, which would improve the quantity and quality of harvest in these areas by reducing fuel loads and the potential for larger crown fires that lead to a loss of forest stands. Restoring forest and woodland old-growth stands to a pre-fire suppression condition could increase tree spacing and encourage understory vegetation in these areas. This likely would increase the quantity and quality of forest and woodland products available for harvest.

Alternative C

Forest and Woodland Harvest Management

Precluding commercial forest and woodland product harvest, including in WC areas, would eliminate the potential for commercial harvest in the decision area. Impacts from permitting commercial and non-commercial harvest of woodland products (e.g., cedar posts, Christmas trees, fuelwood, and biomass utilization) on a case-by-case basis would be the same as Alternative B.

Limits or Restrictions on Harvest

Additional restrictions on surface disturbing activities would decrease the area available for harvest. No surface disturbing actions would be allowed on 32,700 acres (6%), increasing the area not allowed for harvest compared to Alternative A. The no surface disturbance restriction would be applied to areas within ¼ mile or the visual horizon of cultural sites; within ½ mile of active bald eagle nest sites; within ½ mile of active, suitable, or potential reintroduction Utah prairie dog habitat/sites; within ¼ mile from suitable riparian habitat for Western yellow-billed cuckoo and Southwestern willow flycatcher, relict vegetation areas; and within 660 feet of riparian areas.

Additional measures to protect special status species would restrict the location, extent, or method of opportunities for product harvest in these areas. Surface disturbing and disruptive activities on identified crucial habitat would be prohibited, and surface disturbing activities would be prohibited within ¼ mile of Western yellow-billed cuckoo and Southwestern willow flycatcher suitable habitat.

VRM Class I areas would increase to 168,300 acres (30%) and VRM Class II areas would increase to 100,000 acres (18%). This would further alter the location, extent, or method of forest and woodland harvest and restrict harvest opportunities. Alterations would be dependent on site-specific conditions and VRM Class objectives following a visual contrast rating analysis and other environmental review.

The Cottonwood Canyon ACEC (3,800 acres), Welsh's Milkweed ACEC (1,300 acres), White Cliffs ACEC (26,000 acres), Vermilion Cliffs ACEC (23,400 acres), and Parunuweap Canyon ACEC (6,100 acres) would all be managed as VRM Class II areas. This would increase the area covered by restrictions that would alter the location, extent, or method of forest and woodland harvest in the ACEC.

Impacts from managing WSRs would be the same as Alternative A because all 15 eligible river segments and corridors (9,230 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Vegetation Management and Habitat Manipulation

Impacts from implementing vegetation treatments would be the same as Alternative B. However, using treatment methods that mimic natural processes would be preferred (e.g., prescribed fire, biological, and hand cutting), which would result in a slower process of vegetation enhancement. Although the same level of ecological condition could be reached over the long term, the rate of recovery likely would be reduced. This likely would reduce the quantity and quality of forest and woodland products available for harvest in the short term.

Alternative D

Forest and Woodland Harvest Management

Permitting commercial forest and woodland product harvest and commercial and non-commercial harvest of woodland products (e.g., cedar posts, Christmas trees, fuelwood, and biomass utilization) areawide would facilitate product harvest. Under Alternative D, harvest could occur over a larger area. However, WSAs would be closed to woodland product harvest, except for incidental collection for onsite campfire use and administrative purposes.

Limits or Restrictions on Harvest

Impacts from restricting surface disturbing activities would slightly increase compared to Alternative A. No surface disturbing actions would be allowed on 19,700 acres (4%). The no surface disturbance restriction would be applied to the same areas as Alternative B.

Impacts from management of special status species would be the same as Alternative B.

VRM Class I areas would increase to 75,400 acres (14%) and VRM Class II areas would increase to 59,900 acres (11%). This would further alter the location, extent, or method of forest and woodland harvest and restrict harvest opportunities. Alterations would be dependent on site-specific conditions and VRM Class objectives following a visual contrast rating analysis and other environmental review.

Impacts from managing ACECs would be eliminated because no areas would be designated as ACECs under Alternative D. Impacts from managing WSRs would be eliminated because no eligible segments would be determined suitable.

Vegetation Management and Habitat Manipulation

Impacts from implementing vegetation treatments would be the same as Alternative B.

Summary

Alternative D would allow forest and woodland product harvest to occur over a larger area than the other alternatives, while Alternative C would eliminate commercial forest and woodland product harvest. Alternatives A and B would allow harvest to continue; however, Alternative B would limit forest and woodland product harvest to only those areas that promote or sustain forest health. Vegetation treatment management actions under Alternatives B and D would provide additional measures to manage and improve vegetation, which maintain or improve the quantity and quality of forest and woodland products available for harvest. Alternatives A and C also would provide vegetation treatments that maintain or improve forest and woodland products; however, Alternative C would use treatments that mimic natural processes, and the resulting enhancements to forest and woodland products would take longer to realize.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources and no unavoidable adverse impacts. Based on historic and anticipated demand, short-term uses of forest and woodland products under each of the alternatives would not result in a loss of the long-term productivity of the forests and woodlands.

4.3.2 Impacts on Livestock Grazing

This section describes potential impacts on livestock grazing resulting from the implementation of management actions for other resource programs. Impacts on resources and resource uses resulting from implementation of the livestock grazing program are discussed in those particular resource sections of this chapter. Impacts on livestock grazing activities are generally the result of activities that affect forage levels, land use restrictions that affect the ability to construct range improvements, and human disturbance/harassment of livestock within grazing allotments. Conducting vegetation treatments likely would have the greatest effect on livestock grazing because such treatments could increase vegetation production and forage available for livestock. Activities that result in surface disturbance (e.g., mineral development, ROW construction, and recreation) or management of resources that results in limiting surface disturbance (e.g., fish and wildlife, vegetation, water resources, soil resources, and visual resources) also would impact livestock grazing by affecting forage levels. Management of fire and forest and woodland products would affect livestock grazing by either preserving or increasing available forage for livestock over the long term.

Impact analyses and conclusions are based on interdisciplinary team knowledge of resources and the project area, review of existing literature, and information provided by BLM resource specialists. Effects are quantified where possible or are described in qualitative terms in the absence of quantitative data.

The analysis is based on the following assumptions:

- Livestock grazing will be managed in accordance with the *Standards for Rangeland Health* and *Guidelines for Grazing Management for BLM Lands in Utah*.
- Livestock grazing will occur throughout the majority of the decision area.
- In the short term, actual forage use in the decision area may increase from current levels due to improving range condition and range recovery from recent drought. Over the long term, forage demand may continue at historic levels.

Under all alternatives, impacts on livestock grazing would not be anticipated as a result of implementing management actions for the following resources and designations: air quality, wilderness, WSAs, and other designations.

Impacts Common to All Alternatives

Livestock Grazing Management

Impacts resulting from livestock grazing would primarily be related to annual forage removal by grazing livestock. Managing livestock grazing according to the *Guidelines for Grazing Management for BLM Lands in Utah* would improve livestock dispersal throughout pastures; control the season, duration, and intensity of grazing; and achieve range condition objectives. The intent of any applied practices and projects would be to improve the condition of the forage, thereby improving grazing management opportunities.

Using livestock grazing to enhance ecosystem health and/or to help accomplish resource objectives on a case-by-case basis could provide for short-term, non-renewable increases in forage for livestock grazing. These increases would not be associated with a permit, so permittees would not be able to regularly plan on incorporating such forage use in seasonal grazing patterns.

Actions that Directly Affect Vegetation Conditions

Management of vegetation resources would generally enhance vegetative conditions and indirectly affect livestock grazing by increasing forage production and stabilizing livestock grazing. Applying the *Standards for Rangeland Health* under the vegetation management program would help to manage surface uses and thereby enhance rangeland conditions, increase long-term forage production, and stabilize livestock grazing. However, managing rangelands according to the *Standards for Rangeland Health* could also affect livestock operators on those allotments not meeting Standards for reasons attributed to grazing. Such adjustments could include season-of-use changes, forage allocation adjustments, implementation of grazing management practices (e.g., growing season deferment, riparian pastures, or exclosures), forage utilization limits, or conversions in kind or type of livestock. Management changes such as these could result in increased operating costs to the livestock operator. Over the long term, achieving the standards would result in maintained/increased water availability and forage production, which would benefit livestock through improved animal distribution, increased weight gain, and improved animal health.

Treatment of invasive species and noxious weeds would serve to control and contain weed species infestations, thereby maintaining forage production, diversity, and vigor. These actions could temporarily displace livestock and reduce available forage. Guidelines for livestock grazing would be implemented to discourage the introduction and spread of weeds.

Surface Disturbing Activities

Surface disturbing activities associated with the development of minerals could disturb soils, remove vegetation, and increase the potential for the introduction and spread of noxious weeds. This would cause a loss of livestock forage and associated AUMs on 2,976 acres over the short term. Reclamation of 2,370 acres would result in 606 acres of long-term surface disturbance. Mineral development activities could increase the potential for livestock harassment and livestock loss from vehicle collisions. However, the improvement of roads associated with mineral development could facilitate livestock management operations by improving access to remote locations within allotments. Given that livestock grazing occurs across most of the decision area, long-term disturbance would result in relatively minor impacts on livestock grazing.

The development of coal resources would be anticipated to result in the initial disturbance of 3,600 acres over the 20-year planning horizon, which would result in a loss of livestock forage in these areas. Reclamation is estimated to begin within 3 years of mining, and an average of 100 acres of disturbance per year would be reclaimed over the long term. Given that livestock grazing occurs across most of the decision area, the long-term disturbance would result in relatively minor impacts on livestock grazing.

Controlling Surface Uses and Surface Disturbance

Implementing BMPs to minimize detrimental impacts on soils from ground disturbing activities and maintaining and/or enhancing riparian areas (*Utah Riparian Management Policy* [UT 2005-091]) through project design features and/or stipulations would help to reduce soil erosion, surface runoff, and sedimentation of streams. This would help to maintain and enhance vegetation and water quality and increase channel stability, which would indirectly provide forage and water for livestock.

Management actions to enhance wildlife habitat could affect livestock grazing by improving vegetation conditions and indirectly maintaining and/or increasing forage production. However, implementing decisions to increase populations of special status species, implementing conservation measures for listed and sensitive species, and prohibiting ground disturbing activities within ½ mile of bald eagle nests and Mexican spotted owl nests could also restrict opportunities for range improvements and other grazing management actions.

Activities associated with the management of cultural and paleontological resources would affect relatively small, localized areas and would not have measurable effects on livestock forage. Mitigating adverse impacts on cultural and paleontological resources and allowing for preservation and interpretation of such resources could include excavation of known sites, which would result in soil disturbances and forage removal. However, restrictions on surface disturbing activities near cultural and paleontological sites could prevent the removal of forage in these areas, but also could result in the modification or relocation of range improvements.

Wildland Fire

Using wildland fire to protect, maintain, and enhance resources could help to improve vegetation conditions and increase forage production and availability for livestock. However, a short-term loss of forage may occur following a fire event. Suppressing wildfires in concert with increased fuels treatments could reduce the occurrence of catastrophic fires and thereby help to maintain vegetation cover and conserve livestock forage. Although suppression actions can create surface disturbances and result in the removal of forage through use of heavy equipment, implementing emergency stabilization and rehabilitation actions after suppression activities would help to mitigate these impacts.

Alternative A

Livestock Grazing Management

Allocating 18,241 active permitted AUMs for livestock grazing and 11,045 AUMs to support wildlife populations would help provide for the orderly use of the range. Orderly use of the range resources would result in possible adjustments to active use AUMs following site-specific analysis of range conditions. Based on historic use, current trends, and these regular adjustments, the level of forage removal from livestock grazing and wildlife is expected to generally maintain or improve existing rangeland conditions, including a sustainable forage base. Some site-specific areas within grazing allotments could receive concentrated livestock and wildlife use due to the availability of water, forage, and nutrients, which could increase competition for forage within those areas. Seasonal and climatic variations and associated variations in the amount of available forage could result in short-term increases in competition for forage with livestock, which could temporarily reduce the amount of forage authorized/available for livestock use. Maintaining Utah Division of Wildlife Resources wildlife population objectives would help to reduce these effects.

Actions that Directly Affect Vegetation Conditions

Conducting vegetation treatments, particularly livestock rangeland treatments, would enhance vegetation conditions and indirectly affect livestock grazing by increasing forage production. These treatments would have a short-term effect on livestock grazing through forage removal and by excluding livestock use for two growing seasons on treated areas, but enhanced rangeland conditions would be realized over the long term. Conducting land treatments to reduce soil loss in identified areas and improve watershed health and implementing erosion control measures in frail watershed areas would help to minimize soil erosion, surface runoff, and sedimentation of water sources and help maintain/improve grass/forb communities. This would help to maintain and enhance overall vegetation conditions and water quality, which would indirectly provide forage and water for livestock. Vegetation treatments under Alternative A would not be conducted in areas containing ponderosa pine trees, which would allow the understory in these areas to increase in shrubs and thereby reduce the percent cover of grasses (i.e., livestock forage). Areas in which vegetation treatments were not successful could be invaded by weed species and/or become reestablished by other undesired vegetation communities, which would reduce available livestock forage over the long term.

Surface Disturbing Activities

Construction activities related to the development of ROWs would remove a small amount of vegetation over the short term and increase the potential for the introduction and spread of noxious weeds, thereby causing a possible loss of livestock forage and associated AUMs. Increased vehicle travel on new roads also would increase the potential for the spread of weeds, animal harassment or injury, or interference with livestock grazing management. However, an increase in improved roads could facilitate livestock management operations by increasing access to remote locations within allotments.

Controlling Surface Uses and Surface Disturbance

Management of special status species could affect livestock grazing though land use restrictions. Managing occupied prairie dog habitat as open to oil and gas leasing subject to major constraints (NSO) and limiting other activities on the surface would reduce the level of surface disturbance in these areas and help to maintain forage. Land use restrictions could also limit the location of rangeland improvements.

Management of vegetation resources would generally serve to enhance vegetative conditions and indirectly affect livestock grazing by increasing forage production. Rehabilitating and reseeding areas with desired species would ensure good forage species for livestock. Prohibiting surface disturbance within 400 feet of streams in the CBGA planning unit would help to maintain riparian vegetation and reduce soil erosion and runoff near water sources, which would indirectly provide forage and water for livestock in this portion of the decision area.

Managing visual resources via VRM Class objectives would serve to reduce the extent of surface disturbance in VRM Class I and II areas and thereby reduce related forage removal and disturbance. Managing visual resources could also limit the location of rangeland improvements. Under Alternative A, 21,200 acres would be managed as VRM Class I and 99,900 acres would be managed as VRM Class II.

Recreation Use

Recreational activities could impact livestock grazing through direct human disturbance. These impacts could include animal displacement, harassment, or injury or interference with livestock grazing management. In addition, concentrated recreation use, especially OHV use, could result in loss of vegetation. Cross-country OHV use on 466,600 acres (84%) could damage and remove forage resources.

Special Designations

Management of river segments to protect their ORVs, free-flowing nature, and tentative classification would include surface use restrictions. Such restrictions would minimize surface disturbance and related vegetation removal, which could help to maintain forage for livestock. Under Alternative A, all 15 eligible river segments (9,230 acres) would receive protection.

Commercial Forest and Woodland Product Harvest

The commercial harvest of forest and woodland products and associated surface disturbances could result in a short-term loss of livestock forage. Over the long term, such activities would increase light penetration to understory vegetation communities (i.e., grasses and forbs) and thereby increase forage production. Forest and woodland product harvest activities could also temporarily displace livestock.

Alternative B

Livestock Grazing Management

The impacts from livestock grazing management in Alternative A would continue throughout the decision area except on the Water Canyon Allotment. Reallocating 48 AUMs on the Water Canyon Allotment from livestock grazing to wildlife would eliminate the opportunity to graze livestock in this allotment.

Actions that Directly Affect Vegetation Conditions

Impacts from implementing vegetation treatments in Alternative A could increase as vegetation treatments could be implemented on an annual average of up to 22,300 acres. Increasing the acres of vegetation treated would increase the short-term displacement of livestock following the treatments, but over the long term increasing treatments would increase and improve vegetation types valuable for livestock grazing. However, because there is no requirement to treat a set acreage, there could be no short-term decreases in forage. If few or no vegetation treatments were implemented, the existing active use AUMs likely would decrease as pinyon-juniper woodlands continue to expand, invading sagebrush steppe vegetation types and reducing understory forage species.

Vegetation treatments would be prioritized to restore areas functioning at less than 51 percent of PNC, restore areas with noxious weed and/or non-native invasive plants, maintain previously treated areas, and achieve other objectives identified in the RMP. This would result in a systematic approach to treating vegetation communities, which likely would improve vegetation conditions and increase forage production to a greater degree than Alternative A. Treatments could be conducted in areas containing ponderosa pine trees, which likely would increase tree spacing and encourage forage production.

Surface Disturbing Activities

Impacts from the development of ROWs would decrease compared to Alternative A based on 75,700 acres being excluded from ROW development. This could decrease the extent of related forage removal, but also decrease opportunities for access to remote locations within allotments.

Controlling Surface Uses and Surface Disturbance

Management of special status species could affect livestock grazing though habitat improvements and land use restrictions. Controlling surface disturbing and disruptive activities to minimize impacts on identified crucial habitat for sensitive species, applying BMPs to avoid or reduce habitat fragmentation, prohibiting surface disturbing activities within ½ mile of active or suitable prairie dog habitat, applying a CSU stipulation to avoid placing oil and gas wells in federally listed and candidate plant species occupied and suitable habitat, and applying an NSO stipulation within ½ mile of Greater sage-grouse leks could help to improve vegetation conditions and thereby improve forage production. However, these actions could also constrain rangeland improvement options by limiting the location of the proposed improvement. Maintaining or improving stream habitat in special status fish habitat would help to improve riparian vegetation and overall stream health, which could increase forage production and enhance water sources used by livestock.

Protective impacts from the management of soil resources would increase compared to Alternative A because cross-country OHV use would be precluded in fragile soil areas and additional efforts would be conducted to reclaim surface disturbances and temporary roads. This could further reduce soil erosion and improve vegetation conditions, which would indirectly increase forage for livestock.

Implementing mitigation measures to minimize impacts on water quality and prohibiting surface discharge of produced water in the Colorado River Basin would reduce soil and salt loads to water

sources and help maintain appropriate stream discharge rates. This would in turn maintain and enhance riparian vegetation and water quality, which would indirectly provide forage and water for livestock.

Implementing additional measures to manage and improve vegetation could increase livestock forage compared to Alternative A. Vegetation resources would be managed to achieve 51 percent or higher of the PNC, which would create a target for rehabilitation efforts that could increase the extent of successfully rehabilitated areas. Restoring forest and woodland old-growth stands to a pre-fire suppression condition could increase tree spacing and encourage understory forage production in these areas.

The effects from management of visual resources would be affected by the increase of VRM Class I areas (76,000 acres, or a 258% increase compared to Alternative A). This would further reduce the extent of surface disturbance and thereby indirectly reduce related forage removal due to surface disturbing activities. Managing visual resources could also limit the location of rangeland improvements.

Recreation Use

Recreational activities could impact livestock grazing through direct human disturbance. These impacts could include animal displacement, harassment, or injury or interference with livestock grazing management. In addition, concentrated recreation use, especially OHV use, could result in loss of vegetation. However, reducing cross-country OHV use to 1,100 acres would eliminate the impacts on livestock forage because the areas remaining open for cross-country OHV use are not conducive to livestock grazing. The remaining impacts on vegetation of OHV use along 1,387 miles of designated routes would be minimal.

Management of the Kanab Community SRMA, Paria SRMA, Moquith Mountain SRMA, Parunuweap SRMA, Orderville SRMA, North Fork Virgin River SRMA, and Escalante SRMA (125,800 total acres) would further emphasize the recreational opportunities available in the decision area and consequently increase the potential for livestock displacement, harassment, or injury or interference with livestock grazing management. However, implementing surface use restrictions within the SRMAs would help to reduce the degree of impact from recreational and other uses. Encouraging primitive types of recreation and prohibiting surface disturbance from oil and gas development in the Kanab Community SRMA (Non-Motorized RMZ), Paria SRMA, Parunuweap SRMA (Non-Motorized RMZ and Uplands RMZ), Orderville Canyon SRMA, and North Fork Virgin River SRMA would help to reduce effects related to recreational use.

Special Designations

Management prescriptions associated with ACECs would affect livestock grazing management by restricting land uses that could result in livestock harassment and forage losses. Managing the Cottonwood Canyon ACEC (3,800 acres) as a VRM Class II area and requiring NSO stipulations on new leases would reduce the extent of surface disturbance in the ACEC and thereby reduce related forage removal and damage. In addition, reallocating 48 AUMs on the Water Canyon Allotment from livestock grazing to wildlife would eliminate the opportunity to graze livestock in this allotment.

Impacts from managing WSRs would decrease compared to Alternative A because only seven eligible river segments (6,310 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Commercial Forest and Woodland Product Harvest

Impacts from commercial harvest of forest and woodland products would be the same as Alternative A.

Alternative C

Livestock Grazing Management

The impacts from livestock grazing management in Alternative A would continue throughout the decision area except on the Water Canyon, Lower North Fork, and Sawmill Allotments. Suspending 88 AUMs for livestock grazing on these three allotments would eliminate the opportunity to graze livestock in these areas for the life of the plan.

Actions that Directly Affect Vegetation Conditions

Impacts from vegetation treatments (e.g., wildlife habitat treatments, watershed treatments, and stewardship contracting) would increase compared to Alternatives A and B because treatments would be required on an annual average of at least 4,650 acres.

However, focusing on treatment methods that mimic natural processes (e.g., prescribed fire, biological, and hand cutting) likely would result in a slower process of vegetation enhancement and related forage increases. Although vegetation conditions in Alternatives A and B could be reached over the long term, the rate of recovery following individual treatments likely would be reduced. This would increase the time that livestock would be precluded following treatments. Not allowing treatments to exceed an annual average of 22,300 acres would ensure vegetation manipulation and associated short-term decreases in forage do not exceed the level of disturbance to which the vegetation communities are historically adapted.

Surface Disturbing Activities

Impacts from the development of ROWs would decrease compared to Alternative A based on 255,200 acres being excluded from ROW development. This could decrease the extent of related forage removal, but also decrease opportunities for access to remote locations within allotments.

Controlling Surface Uses and Surface Disturbance

Restrictions on surface uses and disturbance due to special status species management in Alternative B would be expanded to include identified crucial habitat for sensitive species, an NSO stipulation that would be applied in federally listed and candidate plant species occupied and suitable habitat, prohibiting surface disturbing activities within ¼ mile of Western yellow-billed cuckoo and Southwestern willow flycatcher suitable habitat, and an NSO stipulation that would be applied within 2 miles of Greater sage-grouse leks. These additional land use restrictions would further help to improve vegetation conditions and increase forage production, but could also increase constraints on options for range improvements.

Protective impacts from the management of soil resources would increase compared to Alternative B because surface disturbing activities would be precluded in fragile soil areas. This could further reduce soil erosion and improve vegetation conditions and thereby increase forage for livestock. Impacts from management of water resources would be the same as Alternative B.

The effects on livestock grazing management resulting from management of visual resources would be affected by the increase of VRM Class I areas (168,300 acres) and VRM Class II areas (100,000 acres). This could further reduce the extent of surface disturbance and thereby reduce related forage removal and damage. This could also further limit the location of rangeland improvements.

Recreation Use

Recreational activities could impact livestock grazing through direct human disturbance. These impacts could include animal displacement, harassment, or injury or interference with livestock grazing

management. In addition, concentrated recreation use, especially OHV use, could result in loss of vegetation. However, eliminating cross-country OHV use and limiting OHV use to 1,190 miles of designated routes would reduce impacts on forage vegetation compared to all the other alternatives. In addition, eliminating the OHV RMZ from the Kanab Community SRMA and the motorized RMZ from the Parunuweap SRMA would reduce the impacts related to OHV use in these areas.

Special Designations

The effects on livestock grazing resulting from managing ACECs would be increased under Alternative C. All five ACECs (60,600 acres) would be managed as VRM Class II areas and would be either closed to mineral development or include stipulations for development (e.g., seasonal constraints or NSO). This would greatly reduce the extent of surface disturbance, thereby reducing related forage removal and disturbance, and limit the location of range improvements as compared to Alternative A. In addition, these ACECs would be closed to new ROWs, which would further reduce the extent of surface disturbance in these areas.

Impacts from the effects on livestock grazing resulting from managing WSRs would be the same as Alternative A because all 15 eligible river segments (9,230 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Commercial Forest and Woodland Product Harvest

Potential impacts on livestock grazing from commercial forest and woodland product harvest would decrease compared to Alternative A because forest and woodland product harvest would be precluded throughout the decision area.

Alternative D

Livestock Grazing Management

The impacts from livestock grazing management in Alternative A would continue throughout the decision area except on the Lower North Fork and Sawmill Allotments. Reallocating 40 AUMs from livestock grazing to wildlife on these two allotments would eliminate the opportunity to graze livestock in these areas.

Actions that Directly Affect Vegetation Conditions

Impacts from implementing vegetation treatments would be the same as Alternative B.

Surface Disturbing Activities

The effects on livestock grazing resulting from the development of ROWs would be similar to Alternative A except 75,200 acres would be excluded from ROW development, which could decrease the extent of related forage removal, but also decrease opportunities for access to remote locations within allotments.

Controlling Surface Uses and Surface Disturbance

Management of special status species, including a NSO stipulation within ¼ mile of Greater sage-grouse leks, could affect livestock grazing through habitat improvements and land use restrictions. These improvements and restrictions could help to improve vegetation conditions, but also could constrain rangeland improvement locations.

Considering the surface discharge of produced water on a case-by-case basis could increase magnitude and intensity of the impacts in Alternative B by increasing the potential for higher water discharge rates and salinity levels in receiving streams. This could result in reduced water quality and channel stability

and thereby reduce forage (riparian vegetation) and water available to livestock. Impacts from management of soil resources would be the same as Alternative B.

The effects on livestock grazing management resulting from management of visual resources would be affected by the increase of VRM Class I areas (75,400 acres, or a 256% increase compared to Alternative A). This would further reduce the extent of surface disturbance and thereby reduce related forage removal. This could also further limit the location of rangeland improvements.

Recreation Use

Recreational activities could impact livestock grazing through direct human disturbance. These impacts could include animal displacement, harassment, or injury or interference with livestock grazing management. In addition, concentrated recreation use, especially OHV use, could result in loss of vegetation. However, reducing cross-country OHV use to 1,100 acres would eliminate the impacts on livestock forage because the areas remaining open for cross-country OHV use are not conducive to livestock grazing. The remaining impacts on vegetation of OHV use along 1,464 miles of designated routes would be minimal.

Special Designations

The effects on livestock grazing from managing ACECs and WSRs would be eliminated because no areas would be designated as ACECs and no eligible river segments would be determined suitable under Alternative D. These areas could be subject to increasing levels of development, which could increase livestock displacement, harassment, and forage removal.

Commercial Forest and Woodland Product Harvest

Impacts from commercial harvest of forest and woodland products would be the same as Alternative A.

Summary

Under all alternatives, adherence to the *Standards for Rangeland Health* and *Guidelines for Grazing Management for BLM Lands in Utah* would improve the long-term condition of the range and the orderly use of the range. While surface disturbing activities, recreational activities, and general human disturbance could lead to site-specific loss of forage, spread of noxious weeds, and displacement of livestock, vegetation treatments would help to offset forage losses by increasing forage production in treatment areas. Management of SRMAs under Alternative B (125,800 total acres) would reduce the impacts of increased recreation use within the decision area. While increased use could increase the degree of forage removal and disturbance to livestock, managing these areas as SRMAs would provide for increased management attention to resource conflicts. This would increase under Alternative C (129,050 total acres). In addition, intensive surface use restrictions would be applied to SRMAs, which could decrease the degree of forage removal and disturbance to livestock. There also would be similar impacts under Alternative D (122,800 total acres).

Under Alternatives B and D, vegetation treatments would be prioritized to restore areas functioning at less than 51 percent of PNC, restore areas with noxious weed and/or non-native invasive plants, and maintain previously treated areas to achieve other objectives identified in the RMP. This likely would improve vegetation conditions and increase forage production beyond those in Alternative A. Under Alternative C, vegetation treatments would be prioritized to restore areas to greater than 76 percent of PNC, preferring the use of methods that use or mimic natural processes. Using these preferred methods would in most cases result in a slower process of vegetation enhancement and related forage increases.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Vegetation treatments and wildland fires that modify range conditions would temporarily reduce forage and would require restricting livestock from treated areas until vegetation becomes sufficiently established to withstand grazing (generally two growing seasons as per Utah Grazing Guidelines). The temporary reductions in forage would be irretrievable. However, this impact would be reversible, and over the long term the treated/restored area would provide improved forage for livestock.

Management actions could result in various short-term impacts on habitat, such as increased localized soil erosion, vegetation damage, and decreased visual resource quality. Surface disturbing activities could result in the greatest potential for impacts on long-term productivity. The limited extent of foreseeable development, mitigating management actions, and application of BMPs would minimize decreases in long-term productivity from short-term uses. There should not be any loss of long-term productivity for livestock grazing because grasses and other forage species could be reclaimed within 2 to 5 years.

Wildland fires and surface disturbing activities could result in unavoidable adverse impacts, although these impacts could be mitigated to the extent possible. Permanent conversion of areas to other uses such as transportation and mineral and energy development would decrease vegetated areas. Applying BMPs, site-specific mitigation efforts, and restoration would decrease these impacts to the degree possible. Permanent mineral developments and their associated infrastructure would be mitigated to the extent possible to minimize loss of range resources.

4.3.3 Impacts on Recreation

This section presents potential impacts on recreation resources, opportunities, and experiences from management actions for other resource programs. Recreation uses within the decision area include backpacking, recreational OHV use, hiking, camping, sightseeing/viewing nature, hunting, fishing, mountain biking, rock climbing, and horseback riding. Impacts on recreation primarily occur from management actions related to other resources or resource uses that result in long-term elimination or reduction of recreation opportunities or degradation of the recreation setting and experience (e.g., limited access, development activities, and the presence of man-made facilities).

Impact analysis and conclusions are based on interdisciplinary team knowledge of resources and the decision area, review of existing literature, and information from other agencies. Effects are quantified where possible. In the absence of quantitative data, best professional judgment was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms if appropriate.

The analysis is based on the following assumptions:

- Recreation use within the planning area will continue to increase during the life of the RMP.
- The incidence of resource damage and conflicts between recreationists involved in motorized and non-motorized activities will increase with increasing use of public lands.
- The existing transportation network will be sufficient to meet the demand of recreational OHV opportunities.
- There will be sufficient opportunities to meet the demand of non-motorized recreation (e.g., hiking, mountain biking, and equestrian).

Under all alternatives, impacts on recreation would not be anticipated as a result of implementing management actions for the following resources and designations: air quality and other designations.

Impacts Common to All Alternatives

Mineral Development

The development of coal resources would be anticipated to result in the initial disturbance of 3,600 acres over the 20-year planning horizon, which could reduce the quality of recreational experiences such as hunting, displace recreationists to other less-developed areas, and eliminate some recreation opportunities. Reclamation is estimated to occur within 3 years of mining, with the disturbed area being reclaimed over the long term. The reclamation would be concurrent/phased as the mining proceeds.

Wildland Fire

Short-term closures of recreation areas and facilities could occur in fire areas during fire suppression activities and through the use of prescribed fire by limiting recreation opportunities. However, managing the decision area for suppression in areas with high resource values and recreation facilities would help maintain and protect recreation facilities and opportunities. In addition, wildland fire could affect other recreation opportunities. Wildland fire could improve wildlife habitat and hunting and viewing opportunities over the long term.

Vegetation Improvement

Implementing BMPs to minimize detrimental impacts on soils from ground disturbing activities and maintaining and/or enhancing riparian areas (*Utah Riparian Management Policy* [UT 2005-091]) through project design features and/or stipulations would help to reduce soil erosion, surface runoff, and sedimentation of streams. This would help to maintain and enhance vegetation and water quality and

increase channel stability, which would indirectly improve the general recreation experience for consumptive and non-consumptive users by enhancing the riparian setting in which recreation activities, such as hiking, picnicking, camping, and fishing, take place.

Management of vegetation resources and implementing actions to enhance wildlife habitat through active treatments could affect recreation by improving ecosystem health and scenic quality. This would indirectly improve the general recreation experience for consumptive and non-consumptive users by enhancing the setting in which recreation activities take place. However, implementing decisions to increase populations of special status species and implementing conservation measures for listed and sensitive species could also restrict opportunities for certain types of recreation opportunities, such as OHV use.

Protecting Specific Recreation Opportunities

Designated wilderness areas are frequent destinations for users seeking solitude and primitive/unconfined recreation opportunities. Maintaining the Paria Canyon-Vermilion Cliffs Wilderness would protect the opportunities for wilderness recreation experiences, while excluding activities that cause conflicts or diminished recreation experiences.

The viewing of cultural resources and collection of some paleontological resources (invertebrate and botanical) are recreational activities that occur within the decision area. Protecting and mitigating impacts on cultural and paleontological resources would help to protect and preserve such resources and thereby maintain these recreation opportunities and related experiences.

Alternative A

Recreation Management Areas

Certain areas throughout the decision area, such as the Orderville and North Fork of the Virgin River Canyons; areas adjacent to Kanab; and the Paria, Moquith, and Parunuweap areas, receive recreation use that currently falls under the custodial management of an extensive recreation management area (ERMA). Because these areas are not provided special recreation management, the recreation demand and use may not be adequately accommodated. This would increase user and resource conflicts throughout these areas, which would affect users and the natural resources that are important to recreationists. A loss of recreation opportunities and degraded recreation experiences could occur in these areas without focused recreation management.

Off-Highway Vehicle Use

Continuing to manage OHV recreation according to the existing OHV designations would provide extensive opportunities for unrestricted cross-country OHV travel, exploring, and route pioneering on approximately 466,600 acres in the decision area. Conflicts between motorized and non-motorized recreation users would continue and would affect the experience of both user groups.

Limiting OHV use to 55 miles of designated routes on approximately 66,200 acres would maintain opportunities for trail-based OHV recreation, while reducing conflicts with users seeking more primitive forms of recreation. Managing 21,200 acres as closed to OHV recreation use would protect opportunities for solitude and primitive/unconfined recreation in the Paria Canyon-Vermilion Cliffs Wilderness.

Mineral Development

Managing oil and gas development would result in varying levels of impact on recreation use. In areas open to oil and gas leasing subject to the standard terms and conditions and moderate constraints (473,400 acres), 2,976 acres of surface disturbance caused by well pads and roads created for mineral exploration

and development could reduce the quality of recreational experiences or eliminate some recreation opportunities for recreationists seeking natural landscapes. This could displace these recreationists to other less-developed areas. Impacts would be greatest on experiences for recreationists seeking natural landscapes because the natural character of affected areas would be degraded by mineral development activities. Adventure/skill-based motorized and mechanized forms of recreation activities would be most compatible with such activities, although the experience could be decreased due to the presence of the mineral developments. In areas open to oil and gas leasing subject to major constraints (5,500 acres) or closed to leasing (75,100 acres), restricting or prohibiting surface occupancy would preserve the natural character of the landscape and thereby maintain backcountry opportunities and experiences for recreation users.

Areas open to locatable mineral development and mineral material sales could allow surface disturbance that could impact the desirability of these areas for recreation use. Recreation opportunities and experiences in these areas could be reduced.

The many geologic formations, outcrops, and features throughout the decision area provide a unique setting for viewing, handling, and collecting small amounts of natural resources. Leaving the decision area open to non-commercial recreational rock-hounding would provide for a unique recreational opportunity. Such collection would enhance recreationists' experience and connection with the decision area's resources.

Controlling Surface Disturbance and Improving Habitat

Management of VRM Class I areas (21,200 acres) would protect scenic quality by restricting landscape change, which would maintain and enhance the recreation experience for users seeking the opportunity for natural settings and solitude. Application of VRM Class II designations (99,900 acres) would retain the existing character of the landscape and would maintain scenic quality, which would enhance the recreation experience throughout these areas. Management of VRM Class III areas (68,600 acres) would generally not affect the type or amount of recreation use that would occur in these areas. Management of VRM Class IV areas (321,800 acres) would allow for major modifications to the landscape, which would diminish scenic quality to a degree that would detract from recreationists seeking natural landscapes.

Management of soils to reduce soil loss on identified areas through land treatments and reseeding actions would protect the quality of the recreational experience in areas where surface occupancy would be allowed and reduce conflicts between recreationists and development activities, thus maintaining recreation opportunities and improving the recreation experience for recreationists seeking natural landscapes. Short-term impacts could occur due to temporary displacement of users during treatment activities.

Recreationists could be displaced from vegetation treatment areas to other more desirable areas until revegetation occurs. However, conducting vegetation treatments would enhance the recreation setting and experience by improving the long-term aesthetics of the treated area. Conducting these treatments to conform to VRM standards would further increase these effects in areas of high visual quality.

Improving big game and fisheries habitat and restricting exploration, drilling, and other development activity through NSO stipulations on a seasonal basis (January 1 through April 30) would improve recreation opportunities and experiences associated with hunting and wildlife observation.

Lands and Realty Actions

Land tenure adjustments could facilitate greater access to recreation areas and reduce conflicts between recreationists within the decision area. Acquisition of legal access for roads and trails in the North Fork

Virgin River and Orderville Gulch area would improve and increase recreational access, thus enhancing the recreation experience and expanding recreation opportunities in these areas.

Special Designations

Continuing to manage the Water Canyon/South Fork Indian Canyon ACEC (220 acres) would maintain primitive recreation opportunities and recreational experiences in the area by protecting natural resources important to recreationists. Prohibiting OHV use in the 1,280-acre area outside the ACEC would eliminate opportunities for recreational OHV use in this area.

Outstanding river-related recreation opportunities would benefit from protection of recreation values, tentative classification, and the free-flowing nature of the 47 miles of eligible river segments (9,230 acres) that would result from continued management of identified river segments as eligible for wild and scenic designation.

Interpretive Opportunities

Development and enhancement of interpretive opportunities associated with the geology at the Vermilion Planning Unit, the physical remains of the CCC developments at Pine Springs, and two archaeological resource sites in the Paria Planning unit would protect and increase heritage tourism opportunities that allow visitors to experience the history in these areas.

Alternative B

Recreation Management Areas

Management of the Kanab Community SRMA (33,100 acres) would provide motorized and non-motorized recreation opportunities in close proximity to the town of Kanab. SRMA management would address user and resource conflicts that occur in the area between these two user groups and would protect and improve the recreation experience for both groups in both SRMA zones.

Management of the Moquith Mountain SRMA (14,900 acres) would provide intensive recreation management for motorized recreation in sand dune areas (open to OHV use) and wooded environments (scenic trail use). Management of the SRMA would address user and resource conflicts while providing for a quality, motorized experience for different types of users. Identification of the Kanab Community and Moquith Mountain SRMAs would allow for focused recreation management in these areas and would diversify recreation opportunities in the area.

Identifying the Paria Canyon area as a SRMA (21,200 acres) and managing the area as closed to OHV use and as a VRM Class I area would protect primitive recreation values and the opportunity for solitude and primitive/unconfined recreation.

Management of the Parunuweap SRMA (30,800 acres) would provide for primitive riparian canyon recreation opportunities and experiences in the Non-Motorized Canyon RMZ. Closing the area to OHV use and oil and gas leasing and managing as a VRM Class I designation would increase opportunities and enhance the setting for non-motorized recreation and primitive/unconfined forms of recreation. The Motorized Canyon RMZ also would provide for primitive riparian canyon recreational opportunities; however, OHV use would be allowed on a single designated route in the canyon bottom. This would provide opportunities for motorized recreation in an area with high scenic quality, but could also increase the potential for user conflicts and displacement of users seeking solitude. The Uplands RMZ would provide for backcountry driving, hiking, and equestrian opportunities, but would not be managed specifically for primitive/unconfined recreation opportunities and experiences.

Management of the Orderville Canyon SRMA (1,950) and North Fork Virgin River SRMA (1,050 acres) would provide for primitive riparian canyon recreational opportunities; however, OHV use would be allowed on designated routes. This would provide opportunities for motorized recreation in an area with high scenic quality, but could also increase the potential for user conflicts and displacement of users seeking solitude.

Management of the Escalante SRMA (22,800 acres) would allow for motorized and non-motorized recreation opportunities in close proximity to the town of Escalante. A trail network would provide for hiking, equestrian, and scenery and wildlife viewing opportunities. Because of its proximity to town and allowed OHV use, the SRMA would not provide opportunities and experiences associated with solitude and primitive/unconfined recreation, but would provide for non-motorized uses in an outdoor natural-looking setting.

Off-Highway Vehicle Use

Opportunities for unrestricted, cross-country OHV use would be restricted to 1,100 acres, which represents a 99.8 percent reduction in areas open to OHV use compared to Alternative A. Most of the areas designated as open to OHV use under Alternative A would be limited to designated routes under Alternative B. In these areas use would be limited to 1,385 miles of routes open year-round and 2 miles of routes closed seasonally. Closing 118 miles of routes to OHV use would eliminate opportunities for OHV use in this area, but these areas would remain open for non-motorized recreation opportunities. In addition, the extent of areas closed to OHV use would increase to 28,900 acres (36% increase compared to Alternative A), which would reduce opportunities for OHV travel and camping in remote areas. However, this increase in the level of restriction on OHV use would reduce conflicts between motorized and non-motorized users, increase public safety, and enhance the recreational experience associated with non-motorized recreation activities.

Approximately 450 miles of new roads would be developed to support exploration and development of oil and gas, but roads associated with non-producing wells would be reclaimed within the life of the plan and would not be open for motorized use. Approximately 100 miles of new roads developed to access producing oil and gas wells would remain open for the life of the plan, but these would be open to recreation use on a case-by-case basis.

Mineral Development

Impacts from oil and gas development would decrease compared to Alternative A. Areas open to oil and gas leasing subject to standard terms and conditions would decrease by 158,800 acres (38% decrease). These areas would generally be managed as open to oil and gas leasing subject to moderate constraints (156,700 acres, 105,500-acre increase) or major constraints (58,100 acres, 52,600-acre increase). While the acres of surface disturbance associated with oil and gas exploration and development would not change (Appendix I), increasing the acres with the various stipulations would result in more and larger areas where surface disturbance associated with mineral development would not be encountered. This would reduce the potential for conflict between mineral developments and recreation opportunities and experiences for recreationists seeking natural landscapes. Areas closed to leasing would increase by 700 acres, but the increase would be in areas associated with primitive recreation opportunities, protecting the experiences of those recreationists.

Areas open to locatable mineral development and mineral material sales could allow surface disturbance that could impact the desirability of these areas for recreation use. Recreation opportunities for recreationists seeking natural landscapes would be reduced in these areas. Closing 78,500 acres to mineral material sales would reduce related surface disturbance and help protect recreation opportunities and experiences in these areas.

Recommending an additional 9,500 acres for withdrawal from locatable mineral entry would reduce the area in which locatable mineral development activities could occur. This would protect opportunities for primitive/unconfined recreation activities and enhance the experience of users seeking this type of recreation opportunity.

Opportunities for recreational rock-hounding would decrease slightly compared to Alternative A due to restrictions on collection of natural resources associated with SRPs, unless authorized. This stipulation would ensure natural resources in popular areas for SRP tours are managed in a sustainable manner, protecting the recreational setting that draws the tours. Collection would still be allowed upon authorization, so the opportunity for such use would not be eliminated, but the collection of natural resources (including rock-hounding) can be spontaneous. Requiring authorization could reduce the experience of some recreationists associated with SRPs.

Controlling Surface Disturbance and Improving Habitat

The effects on recreation from visual resources management would be similar to Alternative A, except the VRM classification of lands would differ, which would affect the degree of impact on recreation opportunities, setting, and experience. Management of VRM Class I areas (76,000 acres, 258% increase) would protect scenic quality by restricting landscape change, which would maintain and enhance the recreation experience for users seeking the opportunity for solitude and primitive/unconfined recreation. Application of VRM Class II designations (93,600 acres, 6% decrease) would retain the existing character of the landscape and would maintain scenic quality, which would enhance the recreation experience throughout these areas. Management of VRM Class III areas (211,500 acres, 208% increase) would generally not limit the type or amount of recreation use that would occur in these areas. Management of VRM Class IV areas (172,900 acres, 46% decrease) would allow for major modifications to the landscape, which would diminish scenic quality to a degree that would detract from recreation experiences for recreationists seeking natural landscapes.

The effects on recreation resulting from management of soil resources would be similar to Alternative A, except cross-country OHV use would be precluded in fragile soil areas and additional efforts would be conducted to reclaim surface disturbances and temporary roads. This would further reduce soil erosion and improve vegetation conditions, which would indirectly improve the general recreation experience for consumptive and non-consumptive users by enhancing the setting in which recreation activities take place.

Implementing additional measures to manage and improve vegetation could further enhance the recreation setting and experience compared to Alternative A for recreationists seeking natural landscapes. Vegetation treatments would be prioritized to restore areas functioning at less than 51 percent of PNC, restore areas with noxious weed and/or non-native invasive plants, maintain previously treated areas, and achieve other objectives identified in this RMP. Treatments would be conducted in areas containing ponderosa pine trees, which likely would increase tree spacing and encourage forage production. This would further improve vegetation conditions and improve the long-term aesthetics of the area, which would indirectly enhance the recreation experience and setting for recreationists seeking natural landscapes.

Management of special status species could affect recreation though habitat improvements and land use restrictions. Controlling surface disturbing and disruptive activities to minimize impacts on identified crucial habitat for sensitive species, applying BMPs to avoid or reduce habitat fragmentation, prohibiting surface disturbing activities within ½ mile of active or suitable prairie dog habitat, applying a CSU stipulation to relocate well placement in federally listed and candidate plant species occupied and suitable habitat, and applying an NSO stipulation within ½ mile of Greater sage-grouse leks would all help to improve ecosystem conditions and the aesthetic value of these areas. This would indirectly enhance the

recreation experience by improving the setting in which these activities take place. However, these actions could also constrain the development of recreation facilities and OHV use. Maintaining or improving stream habitat in special status fish habitat would help to improve riparian conditions, which could enhance the recreation setting and experience in these areas for recreationists seeking natural landscapes.

Prohibiting surface disturbing activities on a seasonal basis in mule deer and elk crucial winter range, crucial Desert bighorn sheep habitat, and crucial pronghorn habitat and precluding oil and gas development and ROW construction in big game migration and transitional ranges would improve opportunities and experience associated with hunting and wildlife observation. These restrictions would be more intensive than Alternative A, which would result in a greater effect on opportunities and experiences associated with hunting and wildlife observation.

Lands and Realty Actions

Managing areas as ROW exclusion (75,700 acres) and avoidance areas (78,900 acres) would affect recreation opportunities, setting, and experience. ROWs would be prohibited in exclusion areas or mitigated in avoidance areas to reduce their impact on the natural environment. Reducing overall development in these areas could increase opportunities for primitive/unconfined recreation activities and enhance the experience of users seeking this type of recreation opportunity.

Special Designations

Managing the Cottonwood Canyon ACEC (3,800 acres) would maintain primitive recreation opportunities and recreational experiences in the area by protecting natural resources important to recreationists. The effects from management of this ACEC would be increased compared to Alternative A because the ACEC would extend beyond the 220-acre Water Canyon/South Fork Indian Canyon ACEC to include considerably more land that would receive protective management. In addition, OHV use would be allowed on designated routes, which would increase OHV opportunities compared to Alternative A, but could also increase the potential for conflicts between motorized and non-motorized users.

The effects on recreation resulting from managing WSRs would be similar to Alternative A, except only seven eligible river segments (6,310 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Interpretive Opportunities

Providing information regarding interpretation of natural and human history and conducting outreach programs through organizations, schools, and partnerships would help to build emotional, intellectual, and recreational ties with the cultural and natural resources within the decision area. In addition, coordinating with local communities and other groups to foster heritage tourism in the decision area would increase such recreation opportunities and enhance associated experiences.

Alternative C

Recreation Management Areas

Management decisions for the Kanab Community SRMA (20,700 acres) would not identify the OHV RMZ. Approximately 89% of the SRMA would be managed as WC areas. The overlapping WC management would not allow opportunities for motorized recreation, and would enhance the experience associated with non-motorized activities. Managing the area for wilderness characteristics could limit the

placement and development of recreation facilities to support non-motorized recreation uses, which could limit developed opportunities.

Impacts from the effects of managing the Paria SRMA (21,200 acres) would be the same as Alternative B.

The effects of managing the Moquith Mountain SRMA (19,300 acres) would be similar to Alternative B, except the Dunes RMZ and 1,300 acres of the Non-Dunes Wooded RMZ would be closed to OHV use. This would limit opportunities for cross-country OHV use to the State Park. However, closing the area to OHV use could also reduce user conflicts and allow for a higher quality experience for non-motorized users. Managing 1,300 acres of the Non-Dunes Wooded RMZ for wilderness characteristics could limit the placement and development of recreation facilities to support non-motorized recreation uses, which could limit developed opportunities.

The effects of managing the Parunuweap SRMA (37,700 acres) would be similar to Alternative B, except the Motorized Canyon RMZ would not be identified and, as a result, the entire SRMA would be closed to OHV use. While this would reduce opportunities for motorized recreation, it would increase opportunities for primitive/unconfined recreation activities and enhance the experience and setting of such activities. Managing 5,100 acres of the Uplands RMZ for wilderness characteristics could limit the placement and development of recreation facilities to support non-motorized recreation uses, which could limit developed opportunities.

The effects of managing the Orderville SRMA (6,300 acres) would be similar to Alternative B, except OHV use would not be allowed. While this would reduce opportunities for motorized recreation, it would increase opportunities for primitive/unconfined recreation activities and enhance the experience and setting of such activities. The extent of the SRMA would be increased by 4,350 acres, thereby increasing opportunities for primitive/unconfined forms of recreation.

The effects of managing the North Fork Virgin River SRMA (1,050 acres) would be similar to Alternative B, except the area would be closed to OHV use. While this would reduce opportunities for motorized recreation, it would reduce user conflicts and increase opportunities and enhance the experience associated with non-motorized activities.

Management of the Escalante SRMA (22,800 acres) would limit OHV use to designated routes except for 6,800 acres that overlap the Wide Hollow WC area. This management would enhance experiences associated with non-motorized and nature-based recreation opportunities.

Off-Highway Vehicle Use

Opportunities for unrestricted, cross-country OHV use would be eliminated because such use would be prohibited across the entire decision area. OHV use on 388,300 acres would be limited to designated routes (322,100-acre increase from Alternative A). Similar to Alternative B, this would reduce conflicts between motorized and non-motorized users and enhance the recreational experience associated with non-motorized recreation activities. Within areas where OHV use is limited to designated routes, 884 miles of routes would remain open year-round and 306 miles of routes would be closed seasonally. Approximately 315 miles of routes would be closed to OHV use, reducing the opportunities for motorized recreation. However, these routes would remain open for non-motorized recreation opportunities. Increasing the extent of closed areas to 165,700 acres (682% increase compared to Alternative A) would reduce opportunities for OHV travel and camping in remote areas.

Approximately 450 miles of new roads would be developed to support exploration and development of oil and gas, but roads associated with non-producing wells would be reclaimed within the life of the plan and

would not be open for motorized use. Approximately 100 miles of new roads developed to access producing oil and gas wells would remain open for the life of the plan, but these would be open to recreation use on a case-by-case basis.

Mineral Development

Impacts from oil and gas development would decrease compared to Alternative A. Areas open to oil and gas leasing subject the standard terms and conditions would decrease by 393,800 acres (a 93% decrease). These areas would generally be managed as open to oil and gas leasing subject to moderate constraints (269,900 acres, 218,700-acre increase) or major constraints (83,100 acres, 77,600-acre increase). While the acres of surface disturbance associated with oil and gas exploration and development would not change (Appendix I), increasing the acres with the various stipulations, especially NSO, would result in more and larger areas where surface disturbance associated with mineral development would not be encountered. This would reduce the potential for conflict between mineral developments and recreation opportunities and experiences. Areas closed to leasing would increase by 97,500 acres, focused on areas associated with primitive and natural-based recreation opportunities, protecting the experiences of those recreationists. This would decrease surface disturbance associated with mineral development more than any other alternative, thereby reducing the degree of impact on recreation opportunities and experiences.

Areas open to locatable mineral development and mineral material sales could allow surface disturbance that could impact the desirability of these areas for recreation use and reduce recreation opportunities in these areas. Closing 175,000 acres to mineral material sales would reduce related surface disturbance and help protect recreation opportunities and experiences in these areas.

Recommending 158,800 acres for withdrawal from locatable mineral entry would reduce the area in which locatable mineral development activities could occur. This would protect opportunities for primitive/unconfined recreation activities and enhance the experience of users seeking this type of recreation opportunity.

Impacts from the recreational rock-hounding would be the same as Alternative B.

Controlling Surface Disturbance and Improving Habitat

The effects on recreation from visual resources management would be similar to Alternative A, except the VRM classification of lands would differ, which would affect the degree of impact on recreation opportunities, setting, and experience. Management of VRM Class I areas (168,300 acres, 147,100-acre increase) would protect scenic quality by restricting landscape change, which would maintain and enhance the recreation experience for users seeking the opportunity for solitude and primitive/unconfined recreation. Application of VRM Class II designations (100,000 acres, 100-acre increase) would retain the existing character of the landscape and would maintain scenic quality, which would enhance the recreation experience throughout these areas. Management of VRM Class III areas (128,300 acres, 87% increase) would generally not affect the type or amount of recreation use that would occur in these areas. Management of VRM Class IV areas (157,400 acres, 51% decrease) would allow for major modifications to the landscape, which would diminish scenic quality to a degree that would detract from recreation experience.

Impacts from management of soil resources improve soil conditions compared to Alternative A because surface disturbing activities would be precluded in fragile soil areas. This would further reduce soil erosion and improve vegetation conditions and indirectly improve the general recreation experience for consumptive and non-consumptive users by enhancing the setting in which recreation activities take place.

The long-term effects from implementing vegetation treatments would be the same as Alternative A, but over the short term, preferring treatment methods that use or mimic natural processes (e.g., prescribed fire, biological, and hand cutting) would result in a slower process of vegetation enhancement. This would indirectly affect recreation settings by slowing the recovery and/or enhancement of the recreation settings and experiences. Although the same level of PNC could be reached over the long term, the rate of recovery likely would be reduced.

The effects from management of special status species would increase compared to Alternative B based on prohibiting surface disturbing and disruptive activities on identified crucial habitat for sensitive species, applying an NSO stipulation in federally listed and candidate plant species occupied and suitable habitat, prohibiting surface disturbing activities within ¼ mile of Western yellow-billed cuckoo and Southwestern willow flycatcher suitable habitat, and applying an NSO stipulation within 2 miles of Greater sage-grouse leks. These additional land use restrictions would further help to enhance the recreation experience by improving the setting in which these activities take place.

Prohibiting surface disturbing activities on a seasonal basis in mule deer and elk crucial and high-value winter range, crucial Desert bighorn sheep habitat, and crucial pronghorn habitat and precluding oil and gas development and ROW construction in big game migration and transitional ranges would improve opportunities and experience associated with hunting and wildlife observation. These restrictions would be slightly more intensive than Alternative B, which would result in a greater effect on opportunities and experiences associated with hunting and wildlife observation.

Lands and Realty Actions

The effects on recreation from lands and realty management would increase considerably compared to Alternative B. The extent of ROW exclusion areas would increase to 255,200 acres, which could further increase opportunities for primitive/unconfined recreation activities and enhance the experience of users seeking this type of recreation opportunity.

Special Designations

The effects on recreation resulting from managing the Cottonwood Canyon ACEC (3,800 acres) would increase opportunities for non-motorized recreation compared to Alternative B due to closing the area to OHV use. This would eliminate opportunities for OHV use in this area, but could also reduce the potential for user conflicts and help to protect opportunities for solitude and primitive/unconfined recreation.

Managing the Welsh's Milkweed ACEC (1,300 acres) would maintain the recreation setting and experience in the area and increase opportunities for primitive/unconfined forms of recreation. This would be accomplished by requiring an NSO stipulation on leasable mineral development and closing the area to locatable and salable mineral development, new ROWs, and OHV use.

Managing the Vermilion Cliffs ACEC (23,400 acres) would maintain the recreation setting and experience in the area. Except for 11,100 acres of the ACEC that overlaps the Vermilion Cliffs WC area, the ACEC would be available for motorized and non-motorized recreation opportunities, which could result in some user conflicts and degrade the experience for recreationists seeking solitude. Managing 11,100 acres of the ACEC as a WC area would enhance experiences associated with non-motorized and nature-based recreation opportunities.

Managing the White Cliffs ACEC (26,000 acres) would maintain the recreation setting and experience in the area. The White Cliffs ACEC is overlapped by the Upper Kanab Creek WC area, which has more restrictive management. Closing the area to mineral development and new ROWs would increase

opportunities for primitive/unconfined forms of recreation. However, rock climbing opportunities would be restricted near R&I raptor nest sites (Appendices B and H). The area would not be available for motorized recreation opportunities.

Managing the Parunuweap Canyon ACEC (6,100) would maintain the recreation setting and experience in the area. Requiring an NSO stipulation on oil and gas development and closing the area to locatable mineral development also would help to increase opportunities for primitive/unconfined forms of recreation. However, the ACEC would be available for motorized and non-motorized recreation opportunities, which could result in some user conflicts and degrade the experience for recreationists seeking solitude and natural settings. Developing interpretive/education displays for ACEC resources would increase heritage tourism opportunities and enhance associated experiences in these areas.

Impacts from the effects on recreation resulting from managing WSRs would be the same as Alternative A because all 15 eligible river segments (9,230 acres) would be determined suitable and managed to protect their ORVs, free-flowing nature, and tentative classification.

Interpretive Opportunities

Impacts from managing interpretation and environmental education would be the same as Alternative B.

Alternative D

Recreation Management Areas

Managing the Kanab Community SRMA (78,300 acres) would provide motorized and non-motorized recreation opportunities in close proximity to the town of Kanab. Compared to Alternative B, opportunities for close-to-town OHV use in a scenic setting would greatly increase because the extent of the SRMA would be increased by 45,200 acres and additional routes would be designated for use. The Non-Motorized RMZ would not be identified. Opportunities for non-motorized recreation would remain, but they would not be the focus of management nor the priority for development of supporting facilities (e.g., trails, trailhead, and maps).

Impacts from the effects of managing the Paria SRMA (21,200 acres) would be the same as Alternative B.

Impacts from the effects of managing the Moquith Mountain SRMA (14,900 acres) would be the same as Alternative B.

The effects of managing the Parunuweap SRMA (8,400 acres) would be similar to Alternative B, except the Uplands RMZ would not be identified, decreasing the size of the SRMA by 22,400 acres. While opportunities for non-motorized recreation would remain, they would not be the focus of management nor the priority for development of supporting facilities (e.g., trails, trailhead, and maps).

The Orderville Canyon SRMA, North Fork Virgin River SRMA, and Escalante SRMA would not be identified and would be managed as part of the ERMA. Without special recreation management, user conflicts would increase in these areas, which would affect users and the natural resources that are important to recreationists. A loss of recreation opportunities and degraded recreation experiences could occur in these areas without focused recreation management.

Off-Highway Vehicle Use

OHV area and route designations would increase opportunities for motorized recreation compared to Alternative B. Opportunities for unrestricted, cross-country OHV use would be limited to approximately

1,100 acres, which represents a 99.8% reduction in areas open to OHV use compared to Alternative A. Most of the areas designated as open to OHV use under Alternative A would be limited to designated routes under Alternative D. In these areas use would be limited to 1,462 miles of routes open year-round and 2 miles of routes closed seasonally. Routes closed to OHV use would be reduced to 41 miles, but these routes would remain open for non-motorized recreation opportunities. In addition, the extent of areas closed to OHV use would increase to 27,600 acres (a 31% increase compared to Alternative A), which would reduce opportunities for OHV travel and camping in remote areas. However, this increase in the level of restriction on OHV use would reduce conflicts between motorized and non-motorized users, increase public safety, and enhance the recreational experience associated with non-motorized recreation activities.

Approximately 450 miles of new roads would be developed to support exploration and development of oil and gas, but roads associated with non-producing wells would be reclaimed within the life of the plan and would not be open for motorized use. Approximately 100 miles of new roads developed to access producing oil and gas wells would remain open for the life of the plan, and these would be open to recreation use on a case-by-case basis.

Mineral Development

Impacts from oil and gas development would decrease compared to Alternative A. Areas open to oil and gas leasing subject to the standard terms and conditions would decrease by 30,900 acres (a 7% decrease). These areas would generally be managed as open to oil and gas leasing subject to moderate constraints (64,600 acres, 13,400-acre increase) or major constraints (23,000 acres, 17,500-acre increase). While the acres of surface disturbance associated with oil and gas exploration and development would not change (Appendix I), increasing the acres with the various stipulations would result in more and larger areas where surface disturbance associated with mineral development would not be encountered. This would reduce the potential for conflict between mineral developments and recreation opportunities and experiences. Areas closed to leasing would be the same as Alternative A. This would maintain the areas currently managed for primitive recreation and solitude (WSAs and Paria Canyon-Vermilion Cliffs Wilderness). Wilderness-based recreation opportunities and experiences would be protected in these areas.

Areas open to locatable mineral development and mineral material sales could allow surface disturbance that could impact the desirability of these areas for recreation use and reduce recreation opportunities in these areas. Closing 21,200 acres to mineral material sales would reduce related surface disturbance and help protect recreation opportunities and experiences in these areas, although this would protect recreation opportunities on the smallest number of acres other than Alternative A.

Recommending just 7 additional acres for withdrawal from locatable mineral entry would protect the limited developed nature and natural setting associated with the Ponderosa Grove Campground. No other areas would receive protection from locatable mineral entry throughout the decision area.

Impacts from the recreational rock-hounding would be the same as Alternative B.

Controlling Surface Disturbance and Improving Habitat

The effects on recreation from visual resources management would increase opportunities for natural-based recreation opportunities compared to Alternative A. Management of VRM Class I areas (75,400 acres, 256% increase) would protect scenic quality by restricting landscape change, which would maintain and enhance the recreation experience for users seeking the opportunity for solitude and primitive/unconfined recreation. Application of VRM Class II designations (59,900 acres, 40% decrease) would retain the existing character of the landscape and would maintain scenic quality, which would

enhance the recreation experience throughout these areas. Management of VRM Class III areas (245,600 acres, 258% increase) would generally not affect the type or amount of recreation use that would occur in these areas. Management of VRM Class IV areas (173,100 acres, 46% decrease) would allow for major modifications to the landscape, which would diminish scenic quality to a degree that would detract from recreation experience.

Impacts from the management of soil resources would be the same as Alternative B.

Impacts from implementing vegetation treatments would be the same as Alternative B.

Impacts from the management of special status species would be the same as Alternative B.

Specific restrictions and stipulations on surface disturbing activities within big game crucial habitat would not be implemented under Alternative D. This likely would result in increased habitat fragmentation and displacement of big game populations, which would decrease opportunities and experiences associated with hunting and wildlife observation.

Lands and Realty Actions

The effects on recreation from lands and realty management would change compared to Alternative B. The extent of ROW avoidance areas would be decreased to 15,200 acres (a 81% decrease), which could decrease opportunities for primitive/unconfined recreation activities. The extent of ROW exclusion areas would remain nearly the same at 75,200 acres.

Special Designations

The effects on recreation resulting from managing ACECs and WSRs would be eliminated because no areas would be designated as ACECs nor determined suitable for inclusion in the NWSRS. As a result, the recreation experience could be degraded and the recreation demand may not be adequately accommodated in these areas. This would reduce opportunities for high-quality scenic recreation opportunities and would increase user and resource conflicts.

Interpretive Opportunities

Impacts from managing interpretation and environmental education would be the same as Alternative B.

Summary

Development activities that create surface disturbances could displace recreationists, reduce opportunities for primitive/unconfined recreation, and degrade the recreation setting and experience of other recreation activities that use natural settings as a component of their activity (e.g., hunting, driving for pleasure, wildlife watching, OHV riding, picnicking). Impacts also would occur in the form of conflicts among recreation users. Motorized recreation use would conflict with non-motorized recreation when they occur in close proximity, and would result in degradation of the setting and experience associated with non-motorized recreation activities.

Land use restrictions would help to reduce these impacts by enhancing the setting in which recreation activities take place and precluding certain activities in areas of user conflict. However, some restrictions could limit opportunities for motorized and hunting activities. In other areas, management decisions would manage for motorized activities, reducing the experience of non-motorized activities that occur in those areas. Under Alternative A, the low level of restrictions would provide the most opportunities for motorized recreation. However, the dispersal of recreation use and the size of the decision area would result in many areas retaining opportunities for non-motorized recreation under Alternative A. Under

Alternative B, the degree of impact would change. Increased land use restrictions to mitigate impacts from mineral development and to protect vegetation and biological resources would be implemented. This would help to maintain recreation opportunities and enhance the recreation setting and experience for recreationists who seek a natural setting in which to recreate (e.g., hunting, driving for pleasure, wildlife watching, OHV riding, picnicking).

Compared to Alternative A, recreational user conflicts would be reduced through management of SRMAs under Alternatives B, C, and D. Management associated with the SRMAs would focus on preservation of scenic, cultural, and biological resources and on allocating lands to different types of recreation uses. SRMAs in Alternative D would generally focus on motorized uses, and SRMAs under Alternative C would generally focus on non-motorized uses. Under Alternative B, portions of the SRMAs would be managed for motorized and non-motorized uses. In addition to reducing user conflicts, this would enhance the recreation setting and experience.

Under Alternative A, there would be extensive opportunities for cross-country OHV use. Under Alternatives B, C, and D, these opportunities would be considerably reduced because open OHV areas would be reduced by 99%. However, trail-based OHV opportunities would remain over most of the decision area, and opportunities for cross-country use would remain at Coral Pink Sand Dunes and a few other small locations under Alternatives B and D. Under Alternative C, there would no opportunities for cross-country OHV use. Trail-based OHV use would still be allowed across most of the decision area.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There could be short-term irretrievable impacts if recreation users are displaced or their experiences or desired outcomes are substantially interfered with by another activity or land use. However, these impacts would not be irreversible. Recreationists will individually implement coping techniques when confronted with undesirable situations while recreating. In addition, the levels of recreation use throughout most of the decision area are low enough that extended periods of interaction between recreation groups are rare.

Long-term disturbance of areas for mineral development (approximately 600 acres) could affect the long-term use of some lands for certain recreation uses seeking natural recreation settings. Some mineral development activities associated with the management actions of the alternatives would have unavoidable, adverse impacts on recreation opportunities and experiences. Exploration and development could fragment hunting areas and impact dispersed recreation.

4.3.4 Impacts on Transportation

This section describes potential impacts on transportation and access resulting from the implementation of management actions for other resource programs. Impacts on resources and resource uses resulting from implementation of the transportation program are discussed in those particular resource sections of this chapter.

The transportation program provides for ingress, egress, and access in the decision area. The following discussion of the effects on transportation and access focuses on management actions that restrict or facilitate transportation and access opportunities. Impacts on opportunities for OHV use is addressed in the recreation impact analysis.

This analysis describes the degree of access and the extent of usable transportation systems within the decision area. This includes actions that would limit the degree of travel opportunities and the ability to access certain portions of the decision area. The majority of motorized access issues are related to OHV use; this form of transportation provides a major source of travel opportunities.

Impacts on transportation and access as defined above (i.e., local roads, via state-maintained highways and BLM-maintained system roads) would be anticipated primarily from route designations and the implementation of management actions that consolidate public land through purchases, exchanges, and disposal of isolated tracts.

The analysis was based on the following assumptions:

- The existing transportation network will remain in place throughout the life of this plan except as noted in the alternatives.
- RS-2477 assertions may be evaluated by the BLM's administrative review procedures or adjudicated by court decision.

Impacts on transportation and access would not be anticipated from implementing management actions for the following resources: air quality, water, vegetation, wildland fire ecology, cultural resources, paleontological resources, visual resources, forestry and woodland products, livestock grazing, minerals and energy, and other designations.

Impacts Common to All Alternatives

Special status species and fish and wildlife actions that limit or prohibit disruptive activities within habitats would limit or eliminate access to some areas, depending on the magnitude and type of use along designated routes. However, roads developed to facilitate mineral exploration and development would increase access to portions of the decision area, if they are available for public use. Based on the RFD scenario (Appendix I) an average of 5 miles of new road would be constructed for each well. Assuming that 20 of the 90 wells would be new production wells, there could be up to 100 miles of new roads associated with oil and gas development. These additional 100 miles of roads would augment the transportation network and improve access.

Coordinating transportation planning with Kane and Garfield counties would provide for cooperative management of transportation systems. This would reduce access issues and management conflicts, improve the safety and convenience of the traveling public, and provide a more efficient use of resources.

Alternative A

Transportation Management

Allowing cross-country OHV use on 466,600 acres (84%) would provide motorized access to most of the decision area. While most motorized use within these acres would use the 1,499 miles that are present on the ground, the availability of cross-country use would allow motorized access regardless of the presence of a route. Limiting use to 57 miles of designated routes on 66,200 acres (12%) would reduce the ability to access any area using motorized means. However, the designated routes in these areas would provide for motorized access to most of these areas, where non-motorized access could be obtained in the areas beyond the designated routes. Closing the Paria Canyon-Vermilion Cliffs Wilderness to motorized access would limit this area to non-motorized means on only 21,200 acres (4%).

Lands and Realty

Allowing land tenure adjustments based on the criteria in Chapter 2 would ensure accessibility to public lands where access is needed and could not be otherwise obtained. In addition, acquiring legal access on roads and trails that are most in demand for public access (North Fork Virgin River and Orderville Gulch area) would increase access to these areas and facilitate travel across the decision area and to adjacent public lands through the creation of a more contiguous decision area, as well as increase access to public lands across private lands.

Alternative B

Transportation Management

Limiting OHV use to designated routes on 524,000 acres (95%) would reduce the ability to gain motorized access to every area in the decision area because access would be restricted to designated routes (Map 2-13). Motorized access in these areas would be allowed on 1,387 miles of routes. The designated routes in these areas would provide for motorized access to most of the decision area, where non-motorized access could be obtained in the areas beyond the designated routes. The 118 miles of routes closed to use would not eliminate access to any portion of the decision area, although in some areas motorized access would require travel on more miles of routes to access the same area. Closing 28,900 acres (5%) to OHV use would limit access in these areas to non-motorized means. Allowing cross-country OHV use on 1,100 acres (less than 1%) would provide unlimited motorized access to only a limited portion of the decision area.

Lands and Realty

Allowing land tenure adjustments based on the criteria in Chapter 2 would ensure accessibility to public lands where access is needed and could not be otherwise obtained and would consolidate public lands, which could potentially contribute to a more cohesive transportation system. This could improve access to public lands and facilitate travel across the decision area. However, disposal actions would remove lands from federal ownership, which could also eliminate public access to those disposed parcels. Conversely, land acquisitions would allow for access to newly acquired lands and facilitate access to adjacent public lands through the creation of a more contiguous decision area. In addition, pursuing easements for access to public lands could provide access as needed and improve motorized OHV opportunities.

Under the lands and realty program, the disposal (via Section 203 sales) of scattered tracts of public land (6,400 total acres) could improve access to private and public land parcels and facilitate travel across the decision area. Approximately 9,500 acres would be considered for withdrawal from public land laws, which would preclude future disposal actions in these areas.

Alternative C

Transportation Management

Limiting OHV use to designated routes on 388,300 acres (70%) would reduce the ability to access any area in the decision area using motorized means (Map 2-14). Motorized access in these areas would be allowed on 1,190 miles of routes. The designated routes in these areas would provide for motorized access to most of the decision area, where non-motorized access could be obtained in the areas beyond the designated routes. However, use on 306 of these miles would be closed seasonally, which would limit motorized access from the decision area to the area north of State Route (SR) 20 and west of U.S. Highway 89 and would make motorized access to the area around Panguitch and Hatch, and from Escalante to U.S. Forest Service (USFS) lands through the decision area, more difficult on a seasonal basis (Map 2-18). In addition, on a seasonal basis motorized access would be eliminated between the Canaan Mountain and Parunuweap WSAs, in an area between Mt. Carmel Junction and Kanab, as well as on many routes south of SR 143 southwest of Panguitch (Map 2-18). These routes, in addition to 315 miles of closed routes, would reduce motorized access to various areas of the decision area. Specifically, motorized access to the Orderville SRMA and through the Upper Kanab Creek WC area would be eliminated, as would motorized access within the WSAs except on cherry-stemmed routes (Map 2-18). Beyond these areas, closing 165,700 acres (30%) would limit access in these areas to non-motorized means. This is 144,500 acres more than Alternative A. No acres within the decision area would be open to cross-country OHV use.

Lands and Realty

Impacts on transportation and access resulting from lands and realty management would be similar to Alternative B, except the extent of disposals (via Section 203 sales) would decrease to 2,500 acres. This could reduce opportunities to consolidate public lands, improve access to public land parcels, and facilitate travel across the decision area. In addition, areas considered for withdrawal would increase to include approximately 158,800 acres (149,300 more acres than Alternative B), which would increase considerably the extent to which future disposal actions would be precluded.

Alternative D

Transportation Management

Limiting OHV use to designated routes on 525,300 acres (95%) would reduce the ability to access any area in the decision area using motorized means (Map 2-15). Motorized access in these areas would be allowed on 1,464 miles of routes. The designated routes in these areas would provide for motorized access to most of the decision area, where non-motorized access could be obtained in the areas beyond the designated routes. The 41 miles of routes closed to use would not eliminate access to any portion of the decision area, although in some areas motorized access would require travel on more miles of routes to access the same area. Closing 27,600 acres (5%) to OHV use would limit access in these areas to non-motorized means. Allowing cross-country OHV use on 1,100 acres (less than 1%) would provide unlimited motorized access to only a limited portion of the decision area.

Lands and Realty

Impacts on transportation and access resulting from lands and realty management would be similar to Alternative B, except the extent of disposals (via Section 203 sales) would increase to 20,500 acres. While this could increase opportunities to consolidate public lands, improve access to public land parcels, and facilitate travel in some portions of the decision area, allowing the sale of lands along the Arizona boarder would result in at least eight routes no longer being in public ownership. This would eliminate motorized and non-motorized access in these areas. In addition, areas considered for withdrawal would

decrease to include only 7 acres, which would decrease the extent to which future disposal actions would be precluded.

Summary

Alternative A would allow for cross-country OHV use on 466,600 acres (84%), providing motorized access to the majority of the decision area. Alternative C would not allow for cross-country OHV use and would be the most restrictive. Alternatives B and D would have similar impacts on motorized access. Under these alternatives, approximately 95 percent of the decision area would be limited to designated routes, which would reduce the ability to access any area using motorized means. However, designated routes in the majority of the planning area would provide for motorized access to most of the decision area, where non-motorized access could be obtained in the areas beyond the designated routes.

Land tenure adjustments could increase opportunities to consolidate public lands, improve access, and facilitate travel in portions of the decision area. Disposals would remove lands from federal ownership, which could eliminate public access. Alternative D would provide for the FLPMA Section 203 sale of 20,500 acres, the most of any alternative, and includes parcels along the Arizona border. The disposal of these lands along the Utah/Arizona border would eliminate motorized and non-motorized access in this area.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources. Limiting use in most of the area to designated routes in the action alternatives would result in a perceived short-term loss of access, but long-term access on designated routes would be maintained due to decreases in impacts on other resource values. Unavoidable adverse impacts also would occur on motorized access. OHV area designations would limit motorized access to designated routes, preclude cross-country travel in the majority of the decision area, and preclude motorized access in the rest of the decision area.

4.3.5 Impacts on Lands and Realty

Lands and realty is a resource use rather than an environmental component. Consequently, impacts on lands and realty are a direct result of the emphasis of other resource programs. The discussion of the effects on lands in each alternative will be limited to the effects on permitted or authorized uses and land tenure adjustments.

The analysis is based on the following assumptions:

- Existing ROWs may be modified or amended if the action is consistent with the RMP.
- ROW holders may renew their ROWs within the terms of the original ROW grant.
- The BLM would continue to process land tenure adjustments consistent with RMP goals and decisions.
- Lands identified for FLPMA Section 203 sale may be sold or otherwise disposed of within the life of the plan.
- The demand for communication sites and ROW corridors would increase within the life of this plan.
- Lands and interests in lands could be acquired from willing landowners by purchase consistent with RMP goals and decisions.

Under all alternatives, impacts on lands and realty are not anticipated as a result of implementing management actions for the following resources and resource uses: air quality, paleontological resources, forestry and woodland products, livestock grazing, transportation, minerals and energy, and wildland fire ecology.

Impacts Common to All Alternatives

ROWs, Leases, and Permits

ROW stipulations could require design and siting requirements and affect associated costs on new or amended ROWs. Restrictions may limit placement of future ROWs. Such requirements could also require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. These restrictions include restricting disturbance in Utah prairie dog and Mexican spotted owl habitats. Seasonal limitations within 1 mile of bald eagle nest sites, within ½ mile of bald eagle winter concentration areas, and year-round restrictions on ground disturbing activities within ½ mile of bald eagle nest sites could limit access and delay project construction of new ROWs. Where seasonal restrictions limit the time available to complete activities, relocation of surface facilities could be required; however, allowing case-by-case exceptions could minimize the potential to affect placement and costs for new ROWs or amended ROWs.

Alternative A

ROWs, Leases, and Permits

ROW stipulations could require design and siting requirements and affect associated costs on new or amended ROWs. ROW restrictions include protection of riparian areas from lands and realty actions and VRM management actions to rehabilitate visual intrusions. Such requirements may restrict placement and could possibly limit future access, delay availability of energy supply (by restricting pipelines, transmission lines, and wind and solar projects), and create dead zones or delay availability of communications service. Such requirements could also require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. There also would be an increased potential for requests for new or amended and renewed ROWs at

existing sites to be denied. Seasonal limitations, such as a ¼ mile restriction around bald eagle roost and perch sites from November 1 to April 30, could limit access and delay project construction of new ROWs and maintenance activity on existing ROWs. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities might be required; however, allowing case-by-case exceptions could minimize the potential to affect placement and costs for new ROWs, or amended ROWs, at existing sites. Design requirements could increase project costs, restrict placement of facilities, and limit future communication site improvements and possibly require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction.

Land Tenure Adjustments

Allowing land tenure adjustments that meet the criteria identified under the lands and realty management action would facilitate access, improve management ability, and reduce conflicts between private landowners and uses within the decision area. Allowing land tenure adjustments also would accommodate resource management needs within the decision area and adjacent communities. Retaining Diana's Throne and the Water Canyon/South Fork Indian Canyon ACEC in public ownership would protect natural resources in these areas. In addition, the retaining of Water Canyon/South Fork Indian Canyon ACEC would maintain the current watershed conditions of this culinary water source.

Alternative B

ROWs, Leases, and Permits

ROWs would be excluded on 75,700 acres (14%) (Map 2-20). ROW exclusion areas include WSAs, wilderness areas, and suitable WSR corridors with a tentative classification of "wild" or "scenic." ROWs would be avoided on 78,900 acres (14%). ROW avoidance areas include the East Fork Virgin River WSR corridor, Greater sage-grouse habitat, and Utah prairie dog colonies. In VRM Class I areas (54,800-acre increase from Alternative A) and Class II areas (6,300-acre decrease from Alternative A), stipulations to meet VRM objectives could be applied to lands and realty actions. These designations and VRM Classes could require design and siting requirements and affect associated costs on new ROWs or amended ROWs. Such requirements may restrict placement and could limit future access, delay availability of energy supply (by restricting pipelines, transmission lines, and wind and solar projects), and create dead zones or delay availability of communications service. Such requirements could also require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction.

Not allowing surface disturbing actions on 19,700 acres (4%) would apply to all ground disturbing activities including lands and realty actions (Map 2-44). Some of these areas coincide with ROW exclusion and ROW avoidance areas. These stipulations would restrict ROW facilities and communication sites from being sited in these areas.

Designating 15,200 acres (3%) as ROW seasonal restriction areas (Map 2-20) and 185,700 acres (34%) as seasonal limitations on surface disturbing actions could limit the time available to complete activities and require relocation of surface facilities (Map 2-44). The ROW seasonal exclusion areas occur around a portion of U.S. Highway 89 between Mt. Carmel Junction and Kanab and a portion of SR 9. However, allowing case-by-case exceptions could minimize the potential to affect placement and costs for ROWs.

Allowing filming permits throughout the decision area following site-specific NEPA analysis could lead to site-specific restrictions applied to the permit. The restrictions could include design and siting requirements, which could affect the filming location and increase costs to conduct filming activities.

Areas available for ROW development (including powerlines, pipelines, wind and solar projects, and communication sites) would accommodate desired placement of facilities, accommodate access and efficient energy supply (by allowing pipelines and transmission lines), and minimize additional costs.

Land Tenure Adjustments

Allowing land tenure adjustments that meet the criteria identified under the lands and realty management actions and considering land acquisitions to preserve cultural resources would facilitate access, improve management ability, and reduce conflicts between private landowners and uses within the planning area. Allowing land tenure adjustments, including FLPMA Section 203 disposals (6,400 acres, 1%), also would accommodate resource management needs within the decision area and adjacent communities (Map 2-26).

Retaining public lands that contain riparian areas, crucial wildlife habitat, Cottonwood Canyon ACEC, sensitive cultural sites, and the Old Spanish National Historic Trail (Highway 89/20 segment in Garfield County) in the public ownership would protect natural resources in these areas. In addition, the retaining of Cottonwood Canyon ACEC, which includes the boundary of the Water Canyon/South Fork Indian Canyon ACEC in Alternative A, would maintain the current watershed conditions of this culinary water source.

Alternative C

ROWs, Leases, and Permits

The intensity and magnitude of impacts associated with ROW exclusion and avoidance areas would increase compared to Alternative B. ROWs would be excluded on 255,200 acres (46%) (Map 2-21). ROW exclusion areas would include WC areas, WSAs, wilderness areas, suitable WSR corridors with a tentative classification of “wild” or “scenic,” some ACECs, and Greater sage-grouse habitat. The majority of the ROW exclusion areas occur along U.S. Highway 89, which could hinder the ability of approving future ROW requests. Designating 3,400 acres (less than 1%) as ROW avoidance areas could require design and siting requirements and affect associated costs on new ROWs or amended ROWs at existing sites (Map 2-21). ROW avoidance areas include the East Fork Virgin River WSR corridor, a portion of the potential Parunuweap Canyon ACEC, and Utah prairie dog colonies. In VRM Class I areas (147,100-acre increase from Alternative A) and Class II areas (100-acre increase from Alternative A), stipulations to meet VRM objectives could be applied to lands and realty actions. These designations and VRM Classes could require design and siting requirements and affect associated costs on new ROWs or amended ROWs.

Not allowing surface disturbing actions on 32,700 acres (6%) would apply to all ground disturbing activities including lands and realty actions (Map 2-45). Some of these areas coincide with ROW exclusion and ROW avoidance areas. These stipulations would restrict ROW facilities and communication sites from being sited in these areas.

Designating 9,800 acres (2%) as ROW seasonal exclusion areas (Map 2-21) and 466,400 acres (84%) as seasonal limitations on surface disturbing actions could limit the time available to complete activities and require relocation of surface facilities (Map 2-45). The seasonal exclusion areas and seasonal limitations could increase project costs, restrict placement of facilities, and limit future communication site improvements and possibly require utility corridors and communication sites to be installed in less desirable locations or in areas with more restrictions on accessibility or construction. However, allowing case-by-case exceptions could minimize the potential to affect placement and costs for new ROWs or amended ROWs at existing sites.

Allowing filming permits throughout the decision area following site-specific NEPA analysis would have the same impacts as Alternative B.

Areas available for ROW development (including powerlines, pipelines, wind and solar projects, and communication sites) would accommodate desired placement of facilities, accommodate access and efficient energy supply (by allowing pipelines and transmission lines), and minimize additional costs.

Land Tenure Adjustments

Allowing land tenure adjustments that meet the criteria identified under the lands and realty management actions and considering land acquisitions to preserve cultural resources would facilitate access, improve management ability, and reduce conflicts between private landowners and uses within the planning area. Allowing land tenure adjustments, including FLPMA Section 203 disposals (2,500 acres, less than 1%), also would accommodate resource management needs within the decision area and adjacent communities (Map 2-27).

Retaining public lands that contain riparian areas, crucial wildlife habitat, WC areas, Cottonwood Canyon ACEC, Welsh's Milkweed ACEC, Vermilion Cliffs ACEC, White Cliffs ACEC, sensitive cultural sites, and the Old Spanish National Historic Trail (Highway 89/20-Garfield County segment) in public ownership would protect natural resources in these areas. In addition, retaining public lands within Cottonwood Canyon ACEC would maintain the current watershed conditions of this culinary water source.

Alternative D

ROWs, Leases, and Permits

The intensity and magnitude of impacts associated with ROW exclusion and avoidance areas would decrease, but the type of impacts would be the same as Alternative B. ROWs would be excluded on 75,200 acres (14%) (Map 2-22). ROW exclusion areas would include WSAs and wilderness areas. Designating 15,200 acres (3%) as ROW avoidance areas could require design and siting requirements and affect associated costs on new ROWs or amended ROWs at existing sites (Map 2-22). ROW avoidance areas include Utah prairie dog colonies and Greater sage-grouse habitat. Impacts associated with ROW avoidance areas would be the same as Alternative B. In VRM Class I areas (54,200-acre increase from Alternative A) and Class II areas (40,000-acre decrease from Alternative A), stipulations to meet VRM objectives could be applied to lands and realty actions. These designations and VRM Classes could require design and siting requirements and affect associated costs on new ROWs or amended ROWs.

Not allowing surface disturbing actions on 19,700 acres (4%) would apply to all ground disturbing activities including lands and realty actions (Map 2-46). Some of these areas coincide with ROW exclusion and ROW avoidance areas. These stipulations would restrict ROW facilities and communication sites from being sited in these areas.

No acres would be designated as ROW seasonal exclusion areas. Designating 71,800 acres (13%) as seasonal limitations on surface disturbing actions (Map 2-46) could limit the time available to complete activities and require relocation of surface facilities. However, allowing case-by-case exceptions could minimize the potential to affect placement and costs for new ROWs or amended ROWs at existing sites.

Allowing filming permits throughout the decision area following site-specific NEPA analysis would have the same impacts as Alternative B.

Areas available for ROW development (including powerlines, pipelines, wind and solar projects, and communication sites) would accommodate desired placement of facilities, accommodate access and efficient energy supply (by allowing pipelines and transmission lines), and minimize additional costs.

Land Tenure Adjustments

Allowing land tenure adjustments that meet the criteria identified under the lands and realty management actions and considering land acquisitions to preserve cultural resources would facilitate access, improve management ability, and reduce conflicts between private landowners and uses within the planning area. Allowing land tenure adjustments, including FLPMA Section 203 disposals (20,500 acres or 4%), also would accommodate resource management needs within the decision area and adjacent communities (Map 2-28). Retaining public lands that contain riparian areas, crucial wildlife habitat, sensitive cultural sites, and the Old Spanish National Historic Trail (Highway 89/20-Garfield County segment) in the public ownership would protect natural resources in these areas.

Summary

Each alternative would allow for use of the Western Utility Group corridors. Alternative B would designate approximately 154,600 acres as ROW exclusion or avoidance areas. Management actions under Alternative B would be less restrictive than Alternative C and more restrictive than Alternative D. Restrictions on ROWs would be greatest under Alternative C. Approximately 258,600 acres (47%) would be designated as ROW exclusion or avoidance areas. Alternative D would have the least restrictions on ROWs with 90,400 acres (16%) designated as ROW exclusion or avoidance areas.

Alternative B would allow FLPMA Section 203 sales of 6,400 acres while retaining public lands that contain riparian areas, crucial wildlife habitat, and sensitive cultural sites. Alternative C would retain more land in public ownership than the other alternatives and would allow FLPMA Section 203 sales of 2,500 acres (less than 1%). Alternative D would allow for FLPMA Section 203 sales of 20,500 acres (4%).

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources, no loss of long-term productivity from short-term uses, and no unavoidable adverse impacts.

4.3.6 Impacts on Minerals and Energy

This section presents potential impacts on energy minerals and non-energy minerals from management actions for other resource and resource use programs. Energy minerals include oil, gas, and coal. Non-energy minerals include locatable minerals, such as gypsum and limestone, and salable minerals, such as sand, gravel, and stone.

The analysis is based on the following assumptions:

- Valid existing leases would be managed under the stipulations in effect when the leases were issued, and new stipulations proposed under this RMP would apply if leases are renewed.
- Leasing and drilling could occur throughout the entire decision area, except where restricted by management actions described in Chapter 2.
- A total of 90 wells (70 exploration and 20 new production wells) could be drilled during the next 20 years, which could result in a future surface disturbance of 2,070 acres and 906 acres of disturbance from seismic operations. Approximately 2,370 acres of the total 2,976 acres would be reclaimed (Appendix I).
- The RFD for 90 oil and gas wells would not vary by alternative due to the low level of development anticipated, acres open for leasing (with standard, moderate, or major constraints) under each alternative, and the historic levels of development.
- The estimated total surface disturbance from coal mining of federal coal in the decision area could entail about 3,600 acres including haul roads and surface facilities. The average annual surface disturbance would be approximately 100 acres, and reclamation would follow shortly behind mining.
- The estimated total surface disturbance from locatable minerals would be from septarian and gypsum (alabaster). Septarian concretions and gypsum mining likely would disturb about 1 acre per year, resulting in a total 20-year surface disturbance of 20 acres.
- The estimated total surface disturbance from salable minerals would be from sand and gravel, stone, and clay operations. Sand and gravel development would result in a total 20-year surface disturbance of 625 acres, with approximately 70 percent on BLM lands. Stone developments likely would be about 20 acres disturbed per year for stone, resulting in a total 20-year surface disturbance of 400 acres. About 70 percent of the disturbance is expected to be on BLM land. Clay exploration or development is expected to result in a surface disturbance of 5 acres.
- As population growth and the demand for energy increases, so will the demand for leasable minerals, mineral materials, and other energy sources.

Under all alternatives, impacts on minerals and energy resources are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, wildland fire ecology, paleontological resources, forestry and woodland products, livestock grazing, transportation, and other designations.

Impacts Common to All Alternatives

Restrictions on surface disturbing activities near bald eagle nests and winter concentration areas; in Mexican spotted owl breeding habitat, designated critical habitat, or identified PACs; and in Western yellow-billed cuckoo and Southwestern willow flycatcher potentially suitable habitat would allow for oil and gas leasing subject to moderate constraints and major constraints. The moderate constraints could result in the relocation of mineral facilities, including oil and gas facilities, or restrict the time available to complete exploration and development activities. The major constraints could require directional drilling or other extraction methods to access resources. Exceptions to moderate constraints (Appendix C) could in some cases allow for exploration and development activities to occur.

Alternative A

Oil and Gas Leasing

Approximately 75,100 acres (14%) would be closed to oil and gas leasing, which would preclude new oil and gas development. However, the impacts from closed areas to oil and gas exploration and development would be relatively minor because no acres of the areas closed to oil and gas leasing would be within areas of high development potential. The areas closed to oil and gas leasing are low in potential for oil and gas development.

Areas open to leasing subject to major constraints (NSO) (5,500 acres or 1%) could require directional drilling or other extraction methods to access resources. This management action could result in the relocation of facilities, increased extraction costs, and the possible loss of energy resources that cannot be reached by current or future drilling technologies or where directional drilling is not a viable option. Approximately 80 percent of the 5,500 acres occurs within areas of high potential for oil and gas, 2 percent coincides with areas of moderate potential, and 18 percent within low potential areas. However, impacts on oil and gas leasing would be relatively minor because the major constraints would apply only to 1 percent of the decision area.

Areas open to leasing subject to moderate constraints (CSU and timing limitation stipulations) (51,200 acres or 9%) could in some cases result in the relocation of mineral facilities, including oil and gas facilities, or restrict the time available to complete exploration and development activities. Controlled surface use stipulations could require construction and installation of facilities in areas that are more difficult to develop or reclaim, or that are located farther from the mineral resource, which would potentially increase operating expenses. Timing limitation stipulations could defer oil and gas development activities and require adjustments in drilling or exploration. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities may be required. Approximately 73 percent of the 51,200 acres occurs within areas of high potential for oil and gas, 4 percent coincides with areas of moderate potential, and 23 percent within low potential areas. Although the majority of the areas with moderate constraints are within areas with high potential, impacts on oil and gas leasing would be relatively minor. The areas with moderate constraints account for only 9 percent of the decision area and exceptions to seasonal restrictions would in some cases allow development activities to occur.

Areas open to leasing subject to standard terms and conditions (422,200 acres or 76%) would allow for oil and gas operations with the least number of restrictions. Approximately 69 percent of the 422,200 acres occurs within areas of high potential for oil and gas, 5 percent coincides with areas of moderate potential, and 26 percent within low potential areas. The majority of the oil and gas exploration and development activities likely would occur in the high-potential areas open to oil and gas leasing.

An analysis of the oil and gas leasing stipulations based on the 2003 Energy Policy and Conservation Act (EPCA) report (USDOI et al. 2003) reveals the effect of cumulative timing stipulations from Alternative A on oil and gas exploration and development, areas open to leasing subject to standard terms and conditions, areas open to leasing subject to moderate constraints (timing limitations, CSU), areas open to leasing subject to major constraints (NSO), and areas closed to leasing (Table 4-19). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and greater than 9 months. Approximately 75,100 acres of the areas closed to leasing are WSAs and the Paria Canyon-Vermilion Cliffs Wilderness Area.

Table 4-19. Alternative A Oil and Gas Leasing Restrictions and Cumulative Timing Limitations

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to the standard terms and conditions on the lease form	292,300	19,100	110,800	422,200
Open to leasing subject to moderate constraints (timing limitation < 3 months).	0	200	1,500	1,700
Open to leasing subject to moderate constraints (timing limitation 3 to 6 months)	3,800	1,800	7,000	12,600
Open to leasing subject to moderate constraints (timing limitation 6 to 9 months)	32,700	60	90	32,850
Open to leasing subject to moderate constraints (timing limitation >9 months)	640	0	0	640
Open to leasing subject to moderate constraints (CSU)	10	0	3,400	3,410
Open to leasing subject to major constraints (NSO)	4,400	100	1,000	5,500
Closed to leasing	0	0	75,100	75,100

The EPCA report (USDOI et al. 2003) estimated the number of oil and gas reserves in the western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas open to leasing subject to major constraints (NSO). Based on information from the EPCA report, no oil and gas resources would be in non-recoverable areas open to leasing subject to major constraints (NSO). Up to 2,300 thousands of barrels of oil and up to 58,700 million cubic feet of gas would be in areas closed to leasing (WSAs and the Paria Canyon-Vermilion Cliffs Wilderness Area) and would not be available for development within the decision area (Table 4-20).

Table 4-20. Alternative A EPCA Analysis

Alternative A	Acres	Total Liquids*	Total Natural Gas**
		(Thousands of Barrels)***	(Millions of cubic feet)****
Proved Reserves and Undiscovered Technically Recoverable Resources			
Open to leasing subject to major constraints (NSO beyond ½ mile)	0	0	0
Closed to leasing	75,100	0 – 2,300	0 – 58,700

Alternative A	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of cubic feet)****

* Comprising oil, natural gas liquids, and liquids associated with natural gas reservoirs
**Comprising associated dissolved and non-associated natural gas
*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).
**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).

Locatable Minerals and Mineral Materials

Approximately 24,591 acres (4%) is currently withdrawn from locatable mineral entry. Areas withdrawn from locatable mineral entry would prohibit locatable mineral development, but would minimally affect the ability to meet the demand for locatable minerals. The Crescent Butte, Shinarump Cliffs, and Vermilion Cliffs recreation sites and the 40-acre ponderosa pine area would be closed to mineral material sales, which would prohibit mineral material development. Closing these areas to mineral material sales would not decrease the ability to meet the overall demand for mineral materials throughout the decision area.

Coal

Coal management actions would allow for the leasing and development of coal resources on lands identified as suitable. Based on the coal unsuitability criteria under Alternative A, portions of the Alton, Kolob, Kaiparowits, and Johns Valley coal fields would be suitable for further leasing consideration. In addition, the RFD scenario for coal (Appendix I) anticipates a coal mine in the Alton area of the Alton coal field. Prior to leasing federal coal lands and permitting a coal mine, further NEPA consideration to address conflicts between multiple uses would be required.

Alternative B

Oil and Gas Leasing

Impacts from areas closed to oil and gas leasing would be similar to those in Alternative A. Approximately 75,800 acres (700 acres more than Alternative A) would be closed to oil and gas leasing, which would preclude new oil and gas development. However, the impacts from closed areas on oil and gas exploration and development would be relatively minor because only 600 acres closed to leasing (less than 1%) are within areas of high development potential. The remaining areas closed to oil and gas leasing are in areas with low potential for oil and gas development.

Impacts on oil and gas exploration and development from areas open to leasing subject to major constraints would be similar to Alternative A. Areas open to leasing subject to major constraints (NSO) (52,600 acres more than Alternative A) could require directional drilling or other extraction methods to access resources. This management action could result in the relocation of facilities, increased extraction costs, and the possible loss of energy resources that cannot be reached by current or future drilling technologies or where directional drilling is not a viable option. Approximately 72 percent of these areas (58,100 acres) occurs within areas of high potential for oil and gas, 7 percent coincides with areas of moderate potential, and 21 percent within low potential areas. However, impacts on oil and gas leasing would be relatively minor because the major constraints would apply to only 11 percent of the decision area.

Areas open to leasing subject to moderate constraints (CSU and timing limitation stipulations) (105,500 acres more than Alternative A) could in some cases result in the relocation of mineral facilities, including oil and gas facilities, or restrict the time available to complete exploration and development activities. CSU stipulations could require construction and installation of facilities in areas that are more difficult to develop or reclaim, or that are located farther from the mineral resource, which would potentially increase operating expenses. Timing limitation stipulations could defer oil and gas development activities and could require adjustments in drilling or exploration. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities may be required. Approximately 73 percent of the this area (156,700 acres) occurs within areas of high potential for oil and gas, 3 percent coincides with areas of moderate potential, and 24 percent within low potential areas. The majority of the areas with moderate constraints are within areas with high potential, which could impact oil and gas exploration and development. However, exceptions to seasonal restrictions would in some cases allow development activities to occur.

Areas open to leasing subject to standard terms and conditions (158,800 acres less than Alternative A) would allow for oil and gas operations with the least number of restrictions. Approximately 68 percent of this area (263,400 acres) occurs within areas of high potential for oil and gas, 5 percent coincides with areas of moderate potential, and 27 percent within low potential areas. The majority of the oil and gas exploration and development activities likely would occur in these areas.

An analysis of the oil and gas leasing stipulations based on the EPCA report (USDOI et al. 2003) reveals the effect of cumulative timing stipulations from Alternative B on oil and gas exploration and development and on areas open to leasing subject to standard terms and conditions, areas open to leasing subject to moderate constraints (timing limitations, CSU), areas open to leasing subject to major constraints (NSO), and areas closed to leasing (Table 4-21). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and more than 9 months. Approximately 75,100 acres of the areas closed to leasing are WSAs.

Table 4-21. Alternative B Oil and Gas Leasing Restrictions and Cumulative Timing Limitations

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to the standard terms and conditions on the lease form	177,700	12,300	73,400	263,400
Open to leasing subject to moderate constraints (timing limitation < 3 months)	8,300	1,500	580	10,380
Open to leasing subject to moderate constraints (timing limitation 3 to 6 months)	38,200	1,900	31,800	71,900
Open to leasing subject to moderate constraints (timing limitation 6 to 9 months)	60,400	1,500	5,600	67,500
Open to leasing subject to moderate constraints (timing limitation >9 months	640	0	80	720

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to moderate constraints (CSU)	6,200	0	0	6,200
Open to leasing subject to major constraints (NSO)	41,700	4,100	12,300	58,100
Closed to leasing	600	0	75,200	75,800

The EPCA report (USDOI et al. 2003) estimated the number of oil and gas reserves in the western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas open to leasing subject to major constraints (NSO). Based on information from the EPCA report, up to 400 thousands of barrels of oil and up to 10,500 million cubic feet of gas would be in non-recoverable areas open to leasing subject to major constraints (NSO). In addition, up to 2,400 thousands of barrels of oil and up to 59,000 million cubic feet of gas would be in areas closed to leasing and would not be available for development within the decision area (Table 4-22).

Table 4-22. Alternative B EPCA Analysis

Alternative B	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Proved Reserves and Undiscovered Technically Recoverable Resources			
Open to leasing subject to major constraints (NSO beyond ½ mile)	13,500	0 – 400	0 – 10,500
Closed to leasing	75,800	0 – 2,400	0 – 59,000

* Comprising oil, natural gas liquids, and liquids associated with natural gas reservoirs
**Comprising associated dissolved and non-associated natural gas
*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).
**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).

Locatable Minerals and Mineral Materials

Approximately 9,500 acres (2%) would be recommended for withdrawal from locatable mineral entry, which would not affect gypsum and septarian prospects. Only very small-scale gypsum and exploration and development activity is expected in the decision area over the next 20 years (Appendix I). The majority of these areas recommended for withdrawal do not coincide with gypsum/septerian concretions development potential areas.

Approximately 78,500 acres (14%) would be closed to mineral material sales, which would not affect sand and gravel and clay disposals. The majority of these areas closed to mineral material sales do not coincide with sand and gravel high development potential areas.

Coal

Coal management actions would allow for the leasing and development of coal resources on lands identified as suitable (Appendix F). The RFD scenario for coal (Appendix I) anticipates a coal mine in the Alton area of the Alton coal field. This area has a high development potential for coal. Based on the coal unsuitability criteria, approximately 113,629 acres would be suitable for further leasing consideration (Map 2-33). Prior to leasing federal coal lands and permitting a coal mine, further NEPA consideration to address conflicts between multiple uses would be required.

Alternative C

Oil and Gas Leasing

Alternative C would have the greatest restriction on oil and gas leasing compared to the other alternatives. While management actions under Alternative C would not reduce the projected number of wells, the management actions could increase costs associated with exploration and development and could require the installation of facilities in less desirable locations.

Due to ACEC, WC areas, some SRMAs, suitable wild river corridors, WSAs, wilderness, and relict vegetation areas management decisions, approximately 97,500 more acres than Alternative A would be closed to oil and gas leasing, which would preclude new oil and gas development. Approximately 56 percent of the areas closed to oil and gas leasing (97,400 acres) occurs within areas of high potential for oil and gas (18% of the decision area) and 44 percent in areas of low potential. The areas closed to oil and gas leasing would not allow oil and gas leasing in specific areas but would not greatly affect the ability to extract oil and gas resources throughout the decision area.

Areas open to leasing subject to major constraints (NSO) (77,600 acres more than Alternative A) could require directional drilling or other extraction methods to access resources. This management action could result in the relocation of facilities, increased extraction costs, and the possible loss of energy resources that cannot be reached by current or future drilling technologies or where directional drilling is not a viable option. Approximately 65 percent of this area (54,100 acres) occurs within areas of high potential for oil and gas, 5 percent coincides with areas of moderate potential, and 30 percent within low potential areas.

Areas open to leasing subject to moderate constraints (CSU and timing limitation stipulations) (218,700 acres more than Alternative A) could in some cases result in the relocation of mineral facilities, including oil and gas facilities, or restrict the time available to complete exploration and development activities. CSU stipulations could require construction and installation of facilities in areas that are more difficult to develop or reclaim, or that are located farther from the mineral resource, which would potentially increase operating expenses. Timing limitation stipulations could defer oil and gas development activities and could require adjustments in drilling or exploration. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities may be required. Approximately 62 percent of these areas (167,800 acres) occur within areas of high potential for oil and gas, 6 percent coincides with areas of moderate potential, and 32 percent within low potential areas. The majority of the areas with moderate constraints are within areas with high potential, which could restrict oil and gas exploration and development.

Areas open to leasing subject to standard terms and conditions (393,800 acres less than Alternative A) would allow for oil and gas operations with the least number of restrictions. Approximately 51 percent of these areas (14,500 acres) occur within areas of high potential for oil and gas, 1 percent coincides with areas of moderate potential, and 48 percent within low potential areas. The majority of the oil and gas exploration and development activities likely would occur in these areas.

An analysis of the oil and gas leasing stipulations based on the EPCA report (USDOI et al. 2003) reveals the effect of cumulative timing stipulations from Alternative C on oil and gas exploration and development and on areas open to leasing subject to standard terms and conditions, areas open to leasing subject to moderate constraints (timing limitations, CSU), areas open to leasing subject to major constraints (NSO), and areas closed to leasing (Table 4-23). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and greater than 9 months. Approximately 75,100 acres of the areas closed to leasing are WSAs.

Table 4-23. Alternative C Oil and Gas Leasing Restrictions and Cumulative Timing Limitations

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to the standard terms and conditions on the lease form	14,500	400	13,500	28,400
Open to leasing subject to moderate constraints (timing limitation < 3 months)	0	0	0	0
Open to leasing subject to moderate constraints (timing limitation 3 to 6 months)	128,600	13,700	81,900	224,200
Open to leasing subject to moderate constraints (timing limitation 6 to 9 months)	26,400	2,800	3,700	32,900
Open to leasing subject to moderate constraints (timing limitation >9 months)	12,800	0	0	12,800
Open to leasing subject to moderate constraints (CSU)	0	0	0	0
Open to leasing subject to major constraints (NSO)	54,100	4,400	24,600	83,100
Closed to leasing	97,400	0	75,200	172,600

The EPCA report (USDOI et al. 2003) estimated the number of oil and gas reserves in the western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas open to leasing subject to major constraints (NSO). Based on information from the EPCA report, up to 400 thousands of barrels of oil and up to 10,000 million cubic feet of gas would be in non-recoverable areas open to leasing subject to major constraints (NSO). In addition, up to 5,400 thousands of barrels of oil and up to 134,800 million cubic feet of gas would be in areas closed to leasing and would not be available for development within the decision area (Table 4-24).

Table 4-24. Alternative C EPCA Analysis

Alternative C	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Proved Reserves and Undiscovered Technically Recoverable Resources			
Open to leasing subject to major constraints (NSO beyond ½ mile)	12,800	0 – 400	0 – 10,000
Closed to leasing	172,600	0 – 5,400	0 – 134,800

* Comprising oil, natural gas liquids, and liquids associated with natural gas reservoirs
**Comprising associated dissolved and non-associated natural gas
*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).
**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).

Locatable Minerals and Mineral Materials

Approximately 158,800 acres (29%) would be recommended for withdrawal from locatable mineral entry. Only very small-scale gypsum and exploration and development activity is expected in the decision area over the next 20 years (Appendix I). The majority of these areas recommended for withdrawal do not coincide with gypsum development potential areas.

Approximately 175,000 acres (32%) would be closed to mineral material sales, which would not affect sand and gravel and stone disposals. The majority of these areas closed to mineral material sales do not coincide with sand and gravel high development potential areas, and the closed areas do not overlap areas with high potential for stone deposit disposals.

Coal

Impacts from coal management actions would be the same as Alternative B.

Alternative D

Oil and Gas Leasing

Impacts on oil and gas exploration and development from areas closed to leasing would be the same as Alternative A.

Areas open to leasing subject to major constraints (NSO) (17,500 acres more than Alternative A) could require directional drilling or other extraction methods to access resources. This management action could result in the relocation of facilities, increased extraction costs, and the possible loss of energy resources that cannot be reached by current or future drilling technologies or where directional drilling is not a viable option. Approximately 30 percent of these areas (7,000 acres) occurs within areas of high potential for oil and gas, 18 percent coincides with areas of moderate potential, and 52 percent is within low potential areas. Impacts on oil and gas leasing would be relatively minor because the major constraints would apply only to 4 percent of the decision area.

Impacts from areas open to leasing subject to moderate constraints would be similar to Alternative A. Areas open to leasing subject to moderate constraints (CSU and timing limitation stipulations) (13,400 acres more than Alternative A) could in some cases result in the relocation of mineral facilities, including oil and gas facilities, or restrict the time available to complete exploration and development activities.

CSU stipulations could require construction and installation of facilities in areas that are more difficult to develop or reclaim, or that are located farther from the mineral resource, which would potentially increase operating expenses. Timing limitation stipulations could defer oil and gas development activities and could require adjustments in drilling or exploration. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities may be required. Approximately 81 percent of these areas (52,140 acres) occurs within areas of high potential for oil and gas, 1 percent coincides with areas of moderate potential, and 18 percent is within low potential areas. Although the majority of the areas with moderate constraints are within areas with high potential, impacts on oil and gas leasing would be relatively minor. The areas with moderate constraints account for only 12 percent of the decision area and exceptions to seasonal restrictions would in some cases allow development activities to occur.

Impacts from areas open to leasing subject to standard terms and conditions would be similar to Alternative A. Areas open to leasing subject to standard terms and conditions (30,900 acres less than Alternative A) would allow for oil and gas operations with the least number of restrictions. Approximately 70 percent of the 274,600 acres occurs within areas of high potential for oil and gas, 4 percent coincides with areas of moderate potential, and 26 percent is within low potential areas. The majority of the oil and gas exploration and development activities likely would occur in these areas.

An analysis of the oil and gas leasing stipulations based on the EPCA report (USDOI et al. 2003) reveals the effect of cumulative timing stipulations under Alternative D on oil and gas exploration and development and on areas open to leasing subject to standard terms and conditions, areas open to leasing subject to moderate constraints (timing limitations, CSU), areas open to leasing subject to major constraints (NSO), and areas closed to leasing (Table 4-25). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and more than 9 months. Approximately 75,100 acres of the areas closed to leasing are WSAs.

Table 4-25. Alternative D Oil and Gas Leasing Restrictions and Cumulative Timing Limitations

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to the standard terms and conditions on the lease form	274,600	16,400	100,300	391,300
Open to leasing subject to moderate constraints (timing limitation < 3 months)	0	0	0	0
Open to leasing subject to moderate constraints (timing limitation 3 to 6 months)	10,200	850	11,600	22,650
Open to leasing subject to moderate constraints (timing limitation 6 to 9 months)	34,300	10	0	34,310
Open to leasing subject to moderate constraints (timing limitation >9 months)	640	0	0	640
Open to leasing subject to moderate constraints (CSU)	7,000	0	0	7,000

Oil and Gas Leasing	Oil and Gas Potential			Total Acres
	High Development Potential (acres)	Moderate Development Potential (acres)	Low Development Potential (includes restricted lands) (acres)	
Open to leasing subject to major constraints (NSO)	7,000	4,100	11,900	23,000
Closed to leasing	0	0	75,100	75,100

The EPCA report (USDOI et al. 2003) estimated the number of oil and gas reserves in the western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas open to leasing subject to major constraints (NSO). Based on information from the EPCA report, up to 15 thousands of barrels of oil and up to 400 million cubic feet of gas would be in non-recoverable areas open to leasing subject to major constraints (NSO). In addition, up to 2,300 thousands of barrels of oil and up to 58,700 million cubic feet of gas would be in areas closed to leasing and would not be available for development within the decision area (Table 4-26).

Table 4-26. Alternative D EPCA Analysis

Alternative D	Acres	Total Liquids*	Total Natural Gas**
		(Thousands of Barrels)***	(Millions of Cubic Feet)****
Proved Reserves and Undiscovered Technically Recoverable Resources			
Open to leasing subject to major constraints (NSO beyond ½ mile)	470	0 – 15	0 – 400
Closed to leasing	75,100	0 – 2,300	0 – 58,700

* Comprising oil, natural gas liquids, and liquids associated with natural gas reservoirs
**Comprising associated dissolved and non-associated natural gas
*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).
**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003 (USDOI et al. 2003).

Locatable Minerals and Mineral Materials

Approximately 7 acres (less than 1%) would be recommended for withdrawal from locatable mineral entry. Only very small-scale gypsum and exploration and development activity is expected in the decision area over the next 20 years (Appendix I). The areas recommended for withdrawal do not coincide with gypsum development potential areas.

Approximately 21,200 acres (4%) would be closed to mineral material sales, but would not affect sand and gravel and stone disposals. The areas closed to mineral material sales do not coincide with sand and gravel high development potential areas and stone high development potential areas.

Coal

Impacts from coal management actions would be the same as Alternative B.

Summary

Oil and Gas Leasing

Closing areas to oil and gas leasing or applying major or moderate constraints to leases directly impacts oil and gas exploration and development. Areas closed to oil and gas leasing would preclude new oil and gas development. Areas open to leasing subject to major constraints could require direction drilling or other extraction methods to access resources. Areas open to leasing subject to moderate constraints could in some cases result in the relocation of mineral facilities or restrict the time available to complete the exploration and development activities. While Alternative B would have slightly more oil and gas leasing stipulations than Alternative A, only 14 percent of the decision area would be closed to leasing. Oil and gas exploration and development could occur on the remaining 86 percent of the decision area. Alternative C would have the greatest restriction on oil and gas leasing compared to the other alternatives. Approximately 5 percent of the decision area would be open to oil and gas leasing subject to standard terms and conditions. While management actions under Alternative C would not reduce the projected number of wells, the management actions could increase costs associated with exploration and development and could require the installation of facilities in less desirable locations. Alternative A would have the fewest restrictions with approximately 76 percent of the decision area open to oil and gas leasing subject to standard terms and conditions.

Locatable Minerals and Mineral Materials

In addition to the 24,591 acres currently withdrawn from locatable mineral entry, recommending withdrawing areas from locatable mineral entry would directly impact locatable mineral exploration and development activities. While Alternative B would recommend more areas for withdrawal than Alternative A, 94 percent of the decision area would be open to locatable mineral development. Alternative D would have the least restriction on locatable mineral exploration and development; it would recommend withdrawing 7 acres. Alternative C would have the greatest restriction, which would recommend withdrawing 158,800 acres from locatable mineral entry. However, the areas recommended for withdrawal under each alternative would not affect gypsum exploration and development activities.

Closing areas to mineral material disposals would directly impact mineral material exploration and development activities. Alternative A would close the fewest acres, and Alternative C would close the most acres (175,000 acres). While Alternative C would be the most restrictive, the majority of the areas closed to mineral material disposals would not close areas with high potential for sand and gravel and stone development.

Coal

Coal management actions would allow for the leasing and development of coal resources on lands identified as suitable (Appendix F). The anticipated coal mine in the Alton area of the Alton coal field could be considered for further leasing under each alternative.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

An irreversible commitment of oil, gas, and coal locatable minerals and mineral materials would occur from development over the next 20 years. There are no impacts on long-term productivity from short-term uses or unavoidable impacts on minerals exploration and development activities.

4.4 SPECIAL DESIGNATIONS

4.4.1 Impacts on Areas of Critical Environmental Concern

There is one existing and five potential ACECs as discussed in Section 3.4.1 and illustrated on Maps 2-37 through 2-39. The existing ACEC is contained wholly within the boundaries of one of the potential ACECs. Of the six potential ACECs, all include scenic R&I values, four include cultural values and wildlife resources, and five include botanical resources. Other R&I values, resources, systems or processes, and hazards/safety/public welfare addressed during this analysis include geologic features, special status species, and human safety. Appendix H contains documentation of the process to evaluate nominations for ACECs and the R&I values for each ACEC.

An ACEC is administratively designated by the BLM for "areas within the public lands where special management attention is required." FLPMA defines an ACEC as an area:

> *"within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards" (FLPMA Section 103(a)).*

This analysis identifies effects of management decisions on the BLM's ability to protect against and prevent irreparable damage to the R&I values associated with each potential ACEC across the alternatives. This analysis addresses impacts on R&I values, which were confirmed by the interdisciplinary team. Protection of R&I values can occur as a result of management associated with designating ACECs, management associated with other special designations (e.g., WSAs and WSRs), general management of public lands (VRM Classes, SRMAs, restrictions on wildlife habitat, special status species management alternatives), or through geographic or topographic characteristics. The most restrictive management that protects an area with R&I values will be the focus of the analysis. Analysis of less restrictive management that would not provide additional protection to an R&I value will not be addressed. For example, if part of an ACEC with scenic R&I values threatened by oil and gas development overlaps a WSA, the WSA management would eliminate the threat of irreparable damage. Therefore, the analysis would not address the impacts of ACEC management for those portions of the ACEC within the WSA, but would analyze the impacts from the WSA.

In concert with BLM guidelines, the impact analysis considers management actions that "defend or guard against damage or loss" to the R&I values. This includes damaged values that can be restored over time and those that are irreparable. The management actions associated with the alternatives could either degrade or protect the R&I values and either cause or prevent irreparable damage to such values.

This section is structured by ACEC, then by alternative. The ACECs are organized in the order they appear in Chapter 2.

Under all alternatives, impacts on identified R&I values are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, soil resources, water resources, vegetation, wildland fire ecology, paleontological resources, forestry and woodland products, livestock grazing, lands and realty, WSRs, wilderness, and other designations.

Water Canyon/South Fork Indian Canyon ACEC

Impacts on the existing Water Canyon/South Fork Indian Canyon ACEC could occur if there were a threat of irreparable damage to scenic values and botanical and biological natural systems or processes. Potential threats include oil and gas development, OHV use, and locatable mineral exploration and development.

Alternative A

The existing ACEC designation would remain and the existing management direction would be sufficient to protect R&I values, botanical and biological natural systems or processes from potential threats.

Alternative B

The existing ACEC would be included in the potential Cottonwood Canyon ACEC. See that section below for a discussion of impacts.

Alternative C

The existing ACEC would be included in the potential Cottonwood Canyon ACEC. See that section below for a discussion of impacts.

Alternative D

Under Alternative D, the Water Canyon/South Fork Indian Canyon ACEC would no longer be designated. This area is contained within the Moquith Mountain WSA. Managing the area as directed by the IMP would protect the R&I values from irreparable damage associated with mineral exploration and development and OHV use.

Cottonwood Canyon ACEC

Impacts on the potential Cottonwood Canyon ACEC could occur if there were a threat of irreparable damage to scenic and cultural values, wildlife resources, botanical and geologic systems or processes, or hazards/safety/public welfare. Potential threats include mineral development, unregulated OHV use, rock climbing, and general surface disturbance.

Alternative A

Although the potential ACEC would not be designated, 2,400 acres (63% of potential ACEC) would be within the Moquith Mountain WSA. Managing the area under the IMP would protect and prevent irreparable damage to the R&I values from surface disturbing activities, including mineral development. Managing areas outside the WSA as VRM Class II would generally maintain the existing character of the landscape, reducing the level of change on the landscape, protecting the scenic values, and providing some protection to the cultural and wildlife values. However, VRM management would not preclude mineral development or other surface disturbing activities. The areas outside the WSA (1,400 acres, 37% of the potential ACEC) would be open to oil and gas leasing subject to the standard terms and conditions of the lease form and to mineral material and locatable mineral exploration and development. Any developments or disturbances in these areas could irreparably damage the Town of Fredonia's watershed.

Managing OHV use within the potential ACEC, but outside the WSA, as open to cross-country use could result in damage to cultural and scenic values and disturb the raptors included as wildlife resources. While the existing 4 miles of route along the bottom of the canyon receive the majority of the OHV use,

allowing unrestricted OHV use in the canyon could result in decreased vegetation, increased soil erosion, and increases in visual contrast where new routes are pioneered. In addition, the lack of restrictions on rock climbing could harm habitats for the following species as noted in Appendix H: Mexican spotted owl, peregrine falcon, fringe myotis bat, Townsend's big-eared bat, and spotted bat.

Alternative B

The ACEC designation and proposed management direction would be sufficient to protect R&I values from potential threats. Allowing oil and gas leasing subject to major constraints (NSO) would eliminate visual intrusions from surface occupancy. In addition, closing the area to mineral materials and locatable mineral entry would eliminate the potential for development of these minerals to potentially contaminate the Town of Fredonia's water source and would protect scenic values and wildlife resources. Allowing OHV use limited to one 4-mile designated route would eliminate the potential for degradation from unregulated OHV use.

Alternative C

The ACEC designation and proposed management direction would be sufficient to protect R&I values from potential threats. Closing the ACEC (3,800 acres) to oil and gas leasing would eliminate visual intrusions from surface occupancy and the potential for development of these minerals. In addition, closing the area to mineral materials and locatable mineral entry would eliminate the potential for development of these minerals to potentially contaminate the Town of Fredonia's water source and would protect scenic values and wildlife resources. Closing the ACEC to OHV use would eliminate the potential for degradation from unregulated OHV use. The 1,200 acres of the ACEC that overlap the Moquith Mountain WC area would be designated as VRM Class I, which would further protect the landscape from visually intrusive uses.

Alternative D

Although the potential ACEC would not be designated, 2,400 acres (63% of the potential ACEC) would be within the Moquith Mountain WSA. Managing the area under the IMP would protect and prevent irreparable damage to the R&I values from surface disturbing activities, including mineral development. Management associated with the Moquith Mountain SRMA Non-Dunes Wooded RMZ would allow oil and gas leasing subject to major constraints (NSO), protecting the R&I values from that threat. However, managing areas outside the WSA as VRM Class III would not provide protection from other visually intrusive uses in the 1,400 acres (37% of potential ACEC) outside the WSA. The management associated with Alternative D could allow livestock grazing and resource development, which could irreparably damage the hazard/safety/public welfare values associated with the Town of Fredonia's watershed, as well as the visual R&I values.

Managing OHV use in the area as limited to designated routes and allowing use along 4 miles of open route along the bottom of the canyon would protect the R&I values from unregulated OHV use. In addition, recreation management in Alternative D would regulate or limit rock climbing near cultural sites and important raptor habitat. This management would protect cultural sites and Mexican spotted owl, peregrine falcon, fringe myotis bat, Townsend's big-eared bat, and spotted bat habitats from harm associated with rock climbing.

Welsh's Milkweed ACEC

Impacts on the potential Welsh's Milkweed ACEC could occur if there were a threat of irreparable damage to scenic, geologic, or special status species (Coral Pink Sand Dunes tiger beetle and Welsh's

milkweed) values. Potential threats to these values include visual intrusions, surface disturbance, removal of vegetation, and OHV use.

Alternative A

Although the potential ACEC would not be designated, 1,250 acres (96% of the potential ACEC) would be within the Moquith Mountain WSA. Managing the area under the IMP would protect and prevent irreparable damage to the R&I scenic values and geologic processes from surface disturbing activities, including mineral development. In addition, harvest of woodland products would not be allowed in the WSA, eliminating the potential for disturbance of Welsh's milkweed habitat. Managing the 50 acres outside the WSA (4% of the potential ACEC) as VRM Class II would generally maintain the existing character of the landscape, reducing the level of change on the landscape and protecting the scenic values.

Special status species management would prohibit motorized use in and through vegetation in designated critical habitat for Welsh's milkweed, protecting this value from irreparable damage associated with OHV disturbance. Similarly, implementing conservation actions identified in the Conservation Agreement and Strategy for the Coral Pink Sand Dunes tiger beetle, including maintaining the established 370-acre conservation area, would protect this R&I resource from irreparable damage.

Alternative B

Impacts on the potential Welsh's Milkweed ACEC would be the same as Alternative A, except that the 50 acres outside the WSA would be designated as VRM Class II, maintaining the existing character of the landscape to provide protection to the scenic values.

Alternative C

The ACEC designation and proposed management direction would be sufficient to protect R&I values, resources, and processes from potential threats. Closing the ACEC to mineral development would eliminate the potential for surface disturbance associated with the development of these minerals, protecting the R&I scenic values and wildlife resources.

Management of the ACEC would prohibit motorized use in and through vegetation in designated critical habitat for Welsh's milkweed, protecting this system from irreparable damage associated with OHV disturbance. Similarly, implementing conservation actions identified in the Conservation Agreement and Strategy for the Coral Pink Sand Dunes tiger beetle, including maintaining the established 370-acre conservation area, would protect this R&I resource from irreparable damage.

Alternative D

Impacts on the potential Welsh's Milkweed ACEC would increase slightly compared to Alternative B due to the 50 acres outside the WSA being managed as VRM Class III. This could allow for more landscape modification in this area, which could irreparably damage the visual quality in this area and the adjacent lands within the viewshed of this area.

Vermilion Cliffs ACEC

Impacts on the potential Vermilion Cliffs ACEC could occur if there were a threat of irreparable damage to scenic and cultural values, wildlife resources, and botanical and geologic systems or processes. Potential threats include visual intrusions, mineral development, and OHV use.

Alternative A

The potential Vermilion Cliffs ACEC is not designated under Alternative A. Managing 68 percent (15,900 acres) of the potential ACEC as VRM Class IV and 11 percent (2,500 acres) as VRM Class III would allow for extensive modifications to the landscape throughout the potential acreage. This would not protect the area from irreparable damage to R&I scenic values. In addition, 97 percent (23,650 acres) of the potential area is open to oil and gas leasing subject to the standard conditions on the lease form, and the area is open to mineral material disposal, resulting in a high potential for development and irreparable damage to R&I scenic values and wildlife resources. In addition, 75 percent of the potential ACEC (17,400 acres) is open to cross-country OHV use. Such use, especially in this area that receives high levels of OHV use, could irreparably damage the R&I cultural values and natural processes (special status species plants).

Alternative B

The potential Vermilion Cliffs ACEC is not designated under Alternative B. Managing 56 percent (13,000 acres) of the potential ACEC as VRM Class II would protect much of the R&I scenic and cultural values from irreparable damage. Managing 39 percent (9,200 acres) of the potential ACEC as VRM Class III would allow for some degree of change to the landscape, allowing for the introduction of visual intrusions into the area. ROWs would be allowed in VRM Class III and IV areas (10,400 acres), which could lead to surface disturbance in localized areas over the short term. Collocating ROWs would reduce these impacts.

Management associated with the Kanab Community SRMA would result in 80 percent (18,800 acres) of the potential ACEC being open for oil and gas leasing subject to major constraints (NSO). This would eliminate the potential for visual intrusions from oil and gas development and for disturbance to the R&I wildlife (raptor) resources. Fish and wildlife and special status species management in Alternative B prohibits disruptive activities within established buffers and seasons to protect raptor species. These restrictions would allow impacts from discretionary activities such as mineral material disposal to be eliminated, protecting the R&I wildlife (raptor) resources from irreparable damage. In addition, management of special status species in Alternative B allows for surface disturbing and disruptive activities to be controlled or regulated in order to minimize impacts on identified crucial habitat for sensitive species. This would protect the R&I botanical natural processes or systems (special status plants) from irreparable damage associated with surface disturbing activities.

OHV use throughout the potential ACEC would be limited to 63 miles of designated routes that already exist, with use being closed seasonally on 14 miles to protect raptor species. Limiting OHV use to these existing designated routes where disturbance has already occurred would protect the R&I cultural values and natural process (special status species plants) from irreparable damage associated with OHV use.

Alternative C

The ACEC designation and proposed management direction would be sufficient to protect scenic and cultural values, wildlife resources, and botanical and geologic systems or processes from potential threats. Approximately 11,100 acres of the ACEC overlap the Vermilion Cliffs WC area, which has more restrictive management. Managing 47 percent of the ACEC as VRM Class I (11,100 acres) and 53 percent of the ACEC as VRM Class II (12,300 acres) would protect the R&I scenic and cultural values from irreparable damage. Limiting OHV use to designated routes on 12,300 acres where disturbance has already occurred and closing OHV use on 11,100 acres would protect the cultural sites and natural process R&I values (special status species plants) from irreparable damage associated with unregulated OHV use.

Managing 12,300 acres (53%) of the potential ACEC as open for oil and gas leasing, subject to major constraints (NSO) would eliminate the potential for visual intrusions from oil and gas development and for disturbance to the R&I wildlife (raptor) resources. Closing 11,100 acres (47%) of the potential ACEC to oil and gas leasing and recommending withdrawing the ACEC from locatable mineral entry would protect the R&I scenic values and wildlife (raptor) resources from irreparable damage.

Alternative D

Although the potential ACEC would not be designated, managing 52 percent (12,200 acres) of the potential ACEC as VRM Class III would allow for some degree of change to the landscape, allowing for the introduction of visual intrusions into the area. Managing 41 percent (9,600 acres) of the potential ACEC as VRM Class II would protect some of the R&I scenic and cultural values from irreparable damage. However, 96 percent (22,500 acres) of the potential area is open to oil and gas leasing subject to the standard conditions on the lease form and open to mineral material disposal, resulting in a high potential for development and irreparable damage to R&I scenic values and wildlife resources.

Management of fish and wildlife and special status species in Alternative D prohibits disruptive activities within established buffers and seasons to protect raptor species. These restrictions would allow impacts from discretionary activities such as mineral material disposal to be eliminated, protecting the R&I wildlife (raptor) resources from irreparable damage. In addition, management of special status in Alternative D allows for surface disturbing and disruptive activities to be controlled or regulated in order to minimize impacts on identified crucial habitat for sensitive species. This would protect the R&I natural systems or processes (special status plants) from irreparable damage associated with surface disturbing activities.

OHV use throughout the potential ACEC would be limited to 62 miles of designated routes that already exist, with use being closed seasonally on 2 miles to protect raptor species. Limiting OHV use to these existing designated routes where disturbance has already occurred would protect the cultural sites and special status species plants from irreparable damage associated with OHV use.

White Cliffs ACEC

Impacts on the potential White Cliffs ACEC could occur if there were a threat of irreparable damage to scenic and cultural values, wildlife resources, and botanical natural systems or processes. Potential threats include visual intrusions, mineral development, and OHV use.

Alternative A

Although the potential ACEC would not be designated, managing 37 percent (9,500 acres) of the potential ACEC as VRM Class IV and 12 percent (3,000 acres) as VRM Class III would allow for extensive modifications to the landscape throughout the potential acreage. This would not protect the area from irreparable damage to R&I scenic values. In addition, the entire area is open to oil and gas leasing subject to the standard terms of the lease form or subject to moderate constraints. The area is also open to mineral material disposal and locatable mineral exploration and development, resulting in a high potential for development and irreparable damage to R&I scenic values and wildlife resources. However, 52 percent (13,400 acres) of the potential ACEC is VRM Class II. Developments in these areas would be required to meet VRM objectives and generally maintain the existing character of the landscape, reducing the level of change on the landscape and protecting the scenic and cultural values.

Managing the entire potential ACEC as open to cross-country OHV use could result in direct damage to the R&I cultural values and natural processes (special status species plants) and in disruption of the R&I

wildlife (raptor) resources. While some of the R&I scenic values could be protected due to VRM Class II objectives, the remainder of the R&I values, resources, and systems would not be protected from irreparable damage.

Alternative B

Although the potential ACEC would not be designated, managing 86 percent (22,400 acres) of the potential ACEC as VRM Class II would protect much of the R&I scenic and cultural values from irreparable damage. Managing 14 percent (3,600 acres) of the potential ACEC as VRM Class III would allow for some degree of change to the landscape, allowing for the introduction of visual intrusions into portions of the area. The areas that are Class III are gentle sloping areas covered in pinyon-juniper woodlands, away from the Class A scenery that qualified as the R&I value.

While 96 percent (24,900 acres) of the potential ACEC is open to oil and gas leasing subject to the standard terms of the lease form or subject to moderate constraints, management in the fish and wildlife and special status species in Alternative B prohibits disruptive activities within established buffers and seasons to protect raptor species. These restrictions would reduce impacts from disruptive activities such as oil and gas, mineral material, and locatable mineral exploration and development, protecting the R&I wildlife (raptor) resources from irreparable damage. In addition, special status species management in Alternative B allows for surface disturbing and disruptive activities to be controlled or regulated in order to minimize impacts on identified crucial habitat for sensitive species. This would protect special status species plants from irreparable damage associated with surface disturbing activities.

OHV use throughout the potential ACEC would be limited to 35 miles of designated routes that already exist. Limiting OHV use to these existing designated routes where disturbance has already occurred would protect the cultural sites and special status species plants from irreparable damage associated with OHV use.

Alternative C

The ACEC designation and proposed management direction would be sufficient to protect the R&I scenic and cultural values, wildlife resources, and botanical natural systems or processes from potential threats. The entire ACEC (26,000 acres) overlaps the Upper Kanab Creek WC area, which would have more restrictive management than the potential ACEC management. Managing the ACEC as VRM Class I would protect the R&I scenic and cultural values from irreparable damage. Closing the ACEC to mineral development would eliminate the potential for surface disturbance and protect the scenic values, botanical natural systems, and wildlife resources.

Alternative D

Although the potential ACEC would not be designated, managing 97 percent (25,100 acres) of the potential ACEC as VRM Class III and managing 97 percent (25,300 acres) as open to oil and gas leasing subject to the standard terms of the lease form and to development of mineral materials and locatable minerals would not protect the R&I scenic values from mineral development. This could result in a high potential for development and irreparable damage to R&I scenic values.

Fish and wildlife and special status species management in Alternative D prohibits disruptive activities within established buffers and seasons to protect raptor species. These restrictions would allow impacts from disruptive activities such as oil and gas, mineral material, and locatable mineral development to be eliminated, protecting the R&I wildlife (raptor) resources from irreparable damage. In addition, special status species management in Alternative D allows for surface disturbing and disruptive activities to be

controlled or regulated in order to minimize impacts on identified crucial habitat for sensitive species. This would protect special status species plants from irreparable damage associated with surface disturbing activities.

OHV use throughout the potential ACEC would be limited to 35 miles of designated routes that already exist. Limiting OHV use to these existing designated routes where disturbance has already occurred would protect the cultural sites and special status species plants from irreparable damage associated with OHV use.

Parunuweap Canyon ACEC

Impacts on the potential Parunuweap Canyon ACEC could occur if there were a threat of irreparable damage to scenic and cultural values and wildlife resources. Potential threats to these values include rock climbing, camping on cultural sites, visual intrusions, mineral development, and OHV use.

Alternative A

Although the potential ACEC would not be designated, 100 percent (6,100 acres) of the potential ACEC would be within the Parunuweap Canyon WSA. Managing the area under the IMP would protect and prevent irreparable damage to the R&I scenic and cultural values from surface disturbing activities and visual intrusions, including mineral development. In addition, recreation management in Alternative A would provide for regulation of rock climbing near cultural sites. Climbing routes that would impact cultural resources would not be allowed unless the R&I cultural values would be protected. OHV use would be limited to 1 mile of designated route, composed of several small intrusions of routes at the canyon rim. Therefore, there would be no threat of irreparable damage from OHV use.

The lack of restrictions on camping could result in inadvertent damage to cultural sites in the potential ACEC. No management in Alternative A would directly eliminate this threat to the R&I cultural values.

Alternative B

The potential Parunuweap Canyon ACEC is not designated under Alternative B. Impacts on the potential Parunuweap Canyon ACEC would decrease compared to Alternative A due to the addition of several recreation management decisions that would provide avenues to eliminate the threat of irreparable damage to R&I cultural values from inadvertent camping on cultural sites. Utilization of environmental education and interpretation and signage to control unauthorized use could educate dispersed users concerning safe locations in which to camp. In addition, issuing SRPs following evaluation of factors, including specific resources that could be impacted such as cultural values and wildlife resources, would provide for education and implementation-specific decisions concerning campsites to eliminate this impact. Due to these recreation decisions, there would be no threat of irreparable damage from camping on R&I cultural values.

Alternative C

The ACEC designation and proposed management direction would be sufficient to protect R&I scenic and cultural values and wildlife resources from potential threats. The entire Parunuweap Canyon ACEC would be within the Parunuweap Canyon WSA. Managing the area under the IMP would protect and prevent irreparable damage to scenic and cultural R&I values from surface disturbing activities and visual intrusions, including mineral development. In addition, ACEC management actions would provide for regulation of rock climbing within 300 feet of cultural sites. Climbing routes that would impact cultural resources would not be allowed unless the R&I cultural values would be protected. OHV use would be

limited to 1 mile of designated route, composed of several small intrusions of routes at the canyon rim. Therefore, there would be no threat of irreparable damage from OHV use. Limiting camping associated with SRPs to identified sites would eliminate this threat to the R&I cultural values.

Alternative D

Impacts on the potential Parunuweap Canyon ACEC would be the same as Alternative B.

Summary

No R&I values, resources, processes, systems, or hazards/safety/public welfare would be threatened with irreparable damage under Alternatives B or C. Under Alternative C, the five potential ACECs (Parunuweap Canyon ACEC, Welsh's Milkweed ACEC, Cottonwood Canyon ACEC, White Cliffs ACEC, and Vermilion Cliffs ACEC) would be designated and would be protected due to special management associated with the ACEC. Under Alternative B, only the Cottonwood Canyon ACEC would be designated; management associated with other resource program decisions would protect the R&I values, resources, processes, or systems in the other potential ACECs. Alternatives A and D would not protect all the identified R&I values, resources, processes, systems, or hazards/safety/public welfare from threats of irreparable damage.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources under any of the alternatives. In the absence of ACEC designation and associated management or management from other resources and/or uses in Alternatives A and D, short-term uses of some of the potential ACECs would impact the long-term productivity of some of the R&I values. Specifically, mineral development in potential ACECs with scenic R&I values could decrease the quality of the scenic values for the life of the plan. In addition, allowing short-term use of the potential Cottonwood Canyon ACEC could eliminate the long-term productivity of the area as a watershed for the Town of Fredonia.

The range of alternatives considers management options that eliminate threats of irreparable damage to all R&I values associated with all potential ACECs in at least one alternative. Therefore, there are no unavoidable adverse impacts that would result in the irreparable damage to R&I values associated with potential ACECs.

4.4.2 Impacts on Wild and Scenic Rivers

This section discusses impacts on eligible WSR segments that would occur from actions associated with each of the alternatives Analysis of impacts on WSRs is limited to the river segment corridor, which includes the viewshed within ¼ mile on each side of a river's high-water mark. In many cases the corridor would be limited to the canyon in which the river segment is located.

The analysis of impacts on WSRs includes an evaluation of where management actions may be inconsistent with the tentative classification given to all eligible or suitable segments and of potential impacts on the ORVs of any eligible or suitable segment. Impacts on the tentative classification of the segments for each alternative will be discussed first, followed by impacts associated with the segment's ORVs. No impacts on WSRs are expected to occur under any alternatives from management actions associated with air quality and other designations. For a more detailed explanation of ORVs, the criteria associated with each ORV, river classifications, and what is allowed within the corridor of each classification, see Appendix G.

Impacts Common to All Alternatives

Because the range of alternatives varies from designating and managing no eligible segments suitable to designating and managing all eligible segments suitable, there are no impacts common to all alternatives.

Alternative A

Under Alternative A, 15 segments, totaling 9,230 acres/46 miles, have been identified as eligible for consideration for suitability and as dictated by policy would be managed to protect their free-flowing nature, ORVs, and tentative classification until such time as a suitability determination is made. Thirteen segments (7,680 acres/39 miles) are tentatively classified as "wild," two segments (1,550 acres/7 miles) are classified as "recreational," and no segments would have the tentative classification of "scenic" (Map 2-40). No impacts on WSRs are expected to occur under Alternative A from management actions associated with non-WSA lands with wilderness characteristics.

Soil, Water, and Vegetation

Allowing for habitat restoration could result in evidence of human activity from surface disturbance along the 7,680 acres/39 miles of segments tentatively classified as "wild"; however, these impacts would be short term in duration and would not result in a change to the tentative classifications. Performing land treatments to reduce soil loss and maintain vegetation structure would impact WSRs by assisting in maintaining plant diversity and preserving the ecological condition of the segments. Management actions to maintain soil levels and vegetation cover, manage noxious weeds, and enhance wildlife habitat could have short-term impacts on wildlife, scenic, ecological, and recreational ORVs by removing vegetation and increasing the potential for erosion and sedimentation, visual intrusions, and loss of habitat. However, over the long term, such actions could increase age and species diversity of plant communities, which would improve or maintain these values.

Special Status Species and Fish and Wildlife

Management actions associated with special status species and fish and wildlife would be compatible with the tentative classifications of all 15 segments because allowable activities and the degree of development within the river corridor would not change. In some instances short-term impacts could occur within "wild" segments from surface disturbance associated with habitat improvements from the increased potential for erosion and sedimentation impacting water quality and on the natural character of the area. In some instances these actions could also result in short-term impacts on the rivers' wildlife, fish, and

scenic and recreational ORVs from any associated improvement and/or development actions; however, over the long term these actions likely would assist in upholding the segment's ORVs by maintaining or improving habitat values.

Wildland Fire Ecology

During and immediately after fire events, access to eligible segments for enjoyment of the opportunities associated with them may be restricted or impaired. Full suppression of wildland fires in these areas may be implemented to control fire size and severity, thus protecting the ORVs within the segment corridors. Short-term impacts could include disturbance to soils, surfaces and groundwater, watershed functions, vegetation conditions, and habitats for special status species and fish and wildlife. Impacts would be minimized by post-fire rehabilitation efforts. Appropriate management response may include limiting the use of mechanical suppression activities or other techniques for reducing impacts on tentative classifications and ORVs. Suppression may be prioritized to protect the unique values threatened by wildfire. To minimize the impairment of the ORVs, Resource Protection Measures have been developed (Appendix L). It is BLM policy to protect eligible/suitable rivers being studied in conjunction with Section 5(d)(1) of the Wild and Scenic Rivers Act. ESR actions would be implemented to stabilize wildfire areas and to minimize the threat of invasive and noxious weed species becoming established.

Cultural and Paleontology

Management actions associated with cultural and paleontology resources within 7,680 acres/39 miles tentatively classified as "wild" and 1,550 acres/7 miles tentatively classified as "recreational" would be compatible with the interim management needed to protect the ORVs and tentative classifications. In some instances, if inventories and collection were to occur within river corridors, short-term impacts could result from associated surface disturbance, particularly segments with "wild" classifications; however, over the long term, these impacts would not likely to change tentative classification of the segment. Law and policy guiding cultural and paleontological resources management would provide indirect protection to those segments that contain cultural or historic ORVs by placing restrictions on surface disturbance activities. In addition, indirect effects from these restrictions could also occur to segments containing scenic, recreational, fish, wildlife, and ecologic ORVs by providing additional protections within the management of these values. Allowing for inventories and collection within river corridors could potentially cause short-term impacts associated with surface disturbance activities; however, over the long term these impacts from associated mitigation measures would be negligible and in some instances may provide additional values to segments, particularly if a significant cultural resource was found.

Visual Resource Management

Current VRM classifications and the associated management likely would be consistent with the tentative classification of the 15 segments' tentative classifications and ORVs because the majority of the segments are located within a VRM Class II area. Restrictions placed on activities that would detract from the natural character of the area would be consistent with allowable activities and the degree of development within the river corridor. In addition, VRM Class II objectives would restrict or mitigate surface disturbance activities that could potentially affect a segment's ORVs. While the Three Mile Creek segment is located within a VRM Class IV area, no impacts on the tentative classification or ORVs would be expected to occur because of less restrictions being placed on "recreational" segments and because mitigation measure would be implemented to aid in protecting the fish ORV of the segment. The VRM Class I classification of the Paria Canyon-Vermilion Cliffs Wilderness would restrict activities that would impact the Paria River segment "wild" classification and ORVs.

Forestry and Woodlands Products

Management associated with forestry and woodland product harvest would be compatible with the 13 segments tentatively classified as "wild" and the two tentatively classified as "recreational" because allowable activities and an allowable degree of development within the river corridor would not change the ORVs.

Livestock Grazing

Livestock grazing management prescriptions likely would be compatible with the tentative classification of the two segments tentatively classified as "recreational"; however, there is a potential that certain rangeland improvements (e.g., fencing and water crossings) could be incompatible in some of the segments tentatively classified as "wild" because of visual intrusions to the natural character of the area. In general, management actions of livestock grazing, which are subject to *Standards for Rangeland Health*, would be compatible with protective management of the segments' ORVs.

Recreation

Management actions associated with recreation likely would be compatible with all eligible segments. Because of the expected increase in recreational activity throughout the decision area there is a potential that the lack of direct recreational management within the river corridors could potentially result in impacts on some of the segments' ORVs.

Transportation

Management associated with OHV designations may not be compatible with the nine segments tentatively classified as "wild" because of designated routes within the eligible corridor. However, most of the designated routes do not run along the segments, but briefly intersect peripheral portions of the viewshed corridors. The "wild" tentative classification of the Paria River, East Fork Virgin River (segment 40a-41), Deep Creek, and South Fork Indian Canyon segments would not be impacted from OHV use because they have no designated routes within their corridors. OHV designations would be compatible with both segments tentatively classified as "recreational." Impacts on recreational ORVs could occur from OHV activity where naturalness and solitude were of concern from increased opportunities for human presence and noise. If OHV use was excessive in eligible corridors, impacts on wildlife ORVs could also occur from displacement and habitat loss.

Lands and Realty

No proposed actions from lands and realty would impact the tentative classification or ORVs of the eligible segments identified under Alternative A because allowable activities and the degree of development within the corridor would be compatible with the interim management needed to protect the ORVs and tentative classifications. Management actions to pursue land acquisitions of non-BLM lands to accomplish resource management goals would provide opportunities to better manage ORVs and to mitigate any efforts that could impact the segments' tentative classification or free-flowing nature.

Minerals and Energy

No impacts are expected to occur from mineral development because there are no valid existing leases located within the eligible segments. Implementation-level planning would provide for protection of eligible segments' tentative classifications and ORVs.

ACECs, WSAs, Wilderness

Management associated with ACECs, WSAs, and wilderness would be compatible with the tentative classification of the segments that are entirely or partially located within these areas and would provide

additional protections to the segments' ORVs. This would particularly be true for segments located within WSAs and wilderness because of restrictions placed on surface disturbance, OHV use, and from managing the wilderness as VRM Class I. Developing an activity plan for the Water Canyon/South Fork Indian Canyon ACEC would indirectly impact the management of the South Fork Indian Canyon, North Branch of South Fork Indian Canyon, and Water Canyon eligible segments by providing additional protections to the segments' tentative classifications and ORVs. Because the segments are located entirely within WSAs, management associated with these areas would assist in protecting the segments' tentative classifications and ORVs. Table 4-27 indicates which eligible segments would be located within these areas.

Table 4-27. Alternative A Eligible Segments Coinciding with ACECs, WSAs, or Wilderness Area

Eligible Segment	Acres within ACEC	Acres within WSA	Acres within Wilderness
North Fork Virgin River	-	North Fork Virgin River (200 acres, 46% of corridor)	-
East Fork Virgin River (Segment 37-40)	-	Parunuweap (960 acres, 100% of corridor)	-
East Fork Virgin River (Segment 40a-41)	-	Parunuweap (770 acres, 100% of corridor)	-
East Fork Virgin River (Segment 36-37)	-	Parunuweap (750 acres, 100% of corridor)	-
Orderville Gulch	-	Orderville (500 acres, 84% of corridor)	-
Meadow Creek/Mineral Gulch	-	Parunuweap (1,570 acres, 89% of corridor)	-
Deep Creek	-		-
Cottonwood Creek	-	Moquith Mountain (20 acres, 9% of corridor)	-
Indian Canyon	-	Moquith Mountain (20 acres, 17% of corridor)	-
South Fork Indian Canyon	Water Canyon/South Fork Indian Canyon (40 acres, 9% of corridor)	Moquith Mountain (450 acres, 100% of corridor)	-
North Branch of South Fork Indian Canyon	Water Canyon/South Fork Indian Canyon (6 acres, 6% of corridor)	Moquith Mountain (90 acres, 100% of corridor)	-
Water Canyon	Water Canyon/South Fork Indian Canyon (120 acres, 17% of corridor)	Moquith Mountain (710 acres, 100% of corridor)	-

Eligible Segment	Acres within ACEC	Acres within WSA	Acres within Wilderness
Hell Dive Canyon	-	Moquith Mountain (310 acres, 88% of corridor)	-
Paria River	-	-	Paria Canyon -Vermilion Cliffs (1,020 acres, 100% of corridor)
Three Mile Creek	-	-	-

Wild and Scenic Rivers

In accordance with *BLM Manual 8351.33A*, with this alternative there would be no suitability decision made at this time, and protection of the ORVs and tentative classifications of all eligible segments (9,230 acres and 46 miles) would continue until suitability decisions are made sometime in the future. ORVs and tentative classifications would be maintained overall because of this management.

Alternative B

Under Alternative B, seven segments, totaling 6,310 acres/33 miles, would be determined as suitable for inclusion in the NWSRS and would be managed to protect their free-flowing nature, ORVs, and tentative classification. Tentative classification of the seven segments is as follows: five segments (4,570 acres/25 miles) are "wild," 1 segment (960 acres/5 miles) is "scenic," and 1 segment (780 acres/3 miles) is "recreational" (Map 2-41). By determining eight of the eligible segments found in Alternative A as not suitable for inclusion in the NWSRS, the BLM would no longer provide any direct protections of the segments' ORVs or tentative classifications. Any protections afforded these values would occur indirectly from management actions associated with other resources. Because no direct protections would be afforded to the eligible segments, there is a potential that impacts could occur to the ORVs that could be severe enough to preclude them from future WSR consideration.

No impacts on WSRs are expected to occur under Alternative B from management actions associated with non-WSA lands with wilderness characteristics. Impacts from wildland fire ecology, forestry woodlands products, and livestock grazing would be the same as Alternative A.

Soil, Water, and Vegetation

Indirect protections provided from soil, water, and vegetation management would be greater than Alternative A due to not allowing new surface disturbance within 330 feet of riparian/wetland areas. This would protect the tentative classification of both "wild" and "scenic" segments by providing additional protections to maintain the integrity of the area. These stipulations also would provide indirect protections to many of the segments' ORVs, such as scenic and wildlife.

Special Status Species and Fish and Wildlife

Impacts from the management of special status species would be greater than Alternative A due to additional protective stipulations. Mitigation to manage habitat loss and prioritize habitat vegetation treatments, various surface disturbance timing stipulations, group size limits, monitoring efforts, and efforts to reestablish native and naturalized fish and wildlife species would provide additional protections to wildlife and fish ORVs. Impacts from such actions would be site-specific and short-term and over the long term likely would provide additional protections to the fish and wildlife ORVs.

Cultural and Paleontology

Indirect protections from cultural and paleontological resource management would increase compared to Alternative A. Precluding surface disturbance activities within ¼ mile or within the visual horizon (whichever is closer) could provide additional protections to the "wild" tentative classification of segments containing cultural ORVs and to the cultural ORVs themselves.

Visual Resource Management

VRM management would help protect the seven suitable segments because they would be either managed as VRM Class I ("wild" segments) or wholly contained within a WSA, which are managed as VRM Class I. Restrictions associated with VRM Class I would preserve the natural appearance of the area, providing additional protections to the tentative classifications and ORVs of the segments by restricting actions that could potentially cause impacts on the segments.

Recreation

Compared to Alternative A, suitable WSRs would receive indirect protection from more detailed recreation management associated with the establishment of SRMAs. Under Alternative B the seven suitable segments, listed in Table 4-28, are located within four of the SRMAs. Management associated with the SRMAs provides additional protection to the tentative classifications and ORVs of the suitable segments.

Transportation

Limiting OHV use to designated routes along the East Fork Virgin River segments tentatively classified "recreational" and "scenic" would be compatible with the classification. Less than 1 mile of route would be designated on the east end of the scenic segment and the remainder of the viewshed would have no designated routes. No impacts would occur from OHV designation to the suitable segments with a tentative classification as "wild" because the five segments would be closed to OHV use. Restrictions on OHV use within suitable segments would provide indirect protections to the segments' ORVs, particularly scenic and wildlife, by restricting use that may reduce the natural character of the area or cause displacement of wildlife.

Lands and Realty

Lands and realty management actions would be more protective of ORVs than Alternative A due to excluding new ROWs from suitable segment corridors with a tentative classification of "wild" or "scenic." This would preclude these surface disturbing and potentially visually obtrusive activities that could potentially impact the segment's ORVs.

Minerals and Energy

No impacts on the tentative classification or ORVs of the seven suitable segments would occur because there are no existing leases located within the segment corridors and because all segments are closed to mineral development.

ACECs, WSAs, Wilderness

Indirect protection from management associated with WSAs and wilderness would increase compared to Alternative A due to limiting SRP group sizes to 12. This would protect recreational ORVs associated with these remote and primitive segments. This would also provide protection to recreational and wildlife ORVs, reducing the number of encounters and maintaining the primitive feel of the areas as well as reducing wildlife displacement by recreationists. Table 4-28 indicates which suitable segments would be

located within one of these areas. Under Alternative B no indirect protections would be afforded suitable segments from ACECs management because no segments would be located within designated ACECs.

Table 4-28. Alternative B Suitable Segments Coinciding with ACECs, WSAs, or Wilderness Area

Suitable Segment	Acres within ACEC	Acres within WSA	Acres within Wilderness
North Fork Virgin River	-	North Fork Virgin River (200 acres, 46% of corridor)	-
East Fork Virgin River (Segment 37-40)	-	Parunuweap (960 acres, 100% of corridor)	-
East Fork Virgin River (Segment 40a-41)	-	Parunuweap (770 acres, 100% of corridor)	-
East Fork Virgin River (Segment 36-37)	-	Parunuweap (750 acres, 100% of corridor)	-
Orderville Gulch	-	Orderville Canyon (500 acres, 84% of corridor)	-
Meadow Creek/Mineral Gulch	-	Parunuweap (1,570 acres, 89% of corridor)	-
Paria River	-	-	Paria-Vermilion (1,020 acres, 100% of corridor)

Wild and Scenic Rivers

Management of suitable WSRs would protect the tentative classifications and ORVs as in Alternative A, but protective management would be formalized through management allocations for other resource uses (e.g., oil and gas leasing stipulations, VRM classifications, OHV area and route designations, etc.) that are consistent with wild and scenic management for suitable segments. Overall, this would provide more protection than Alternative A for suitable segments, but non-suitable segments would be vulnerable to change.

Alternative C

Under Alternative C, all 15 segments (9,230 acres/46 miles) found eligible under Alternative A would be determined suitable for inclusion in the NWSRS and would be managed to protect their free-flowing nature, ORVs, and tentative classification. The tentative classification of the 15 segments would be the same as Alternative A, which includes 13 “wild” segments (7,680 acres/39 miles), two “recreational” segments (1,550 acres/7 miles), and no segments tentatively classified as “scenic” (Map 2-42). Overall, Alternative C would provide more protection than Alternative A for all eligible segments because management allocations for other resource uses, including wilderness characteristics, would be consistent with WSR management for suitable segments.

Impacts from management actions associated with cultural and paleontology and wild and scenic segments would be the same as Alternative B. Impacts from wildland fire ecology and livestock grazing would be the same as Alternative A.

Soil, Water, and Vegetation

Indirect protections provided from soil, water, and vegetation management would be greater than in Alternative B because restrictions for new surface disturbing activities near riparian/wetland areas would increase from 330 feet to 660 feet. Compared to Alternative B, management also would require any loss of habitat types to be restored in close proximity to the original area. This would help mitigate impacts by maintaining connectivity of habitat and any impacts on wildlife. Emphasizing natural processes to reduce the spread of noxious weeds and to restore ecological functioning could result in a greater potential for an invasion of noxious weeds within suitable corridors due to less aggressive techniques being used. Impacts on some ORVs, such as scenic, could be more long term than those identified under other alternatives because of management relying on natural processes for restoration efforts.

Special Status Species and Fish and Wildlife

Impacts associated with special status species and fish and wildlife management would be greater than Alternative B based on increased timing stipulations placed on surface disturbance and OHV use. This would provide additional protections to wildlife and some recreational ORVs.

Visual Resource Management

VRM management would help protect the 13 suitable segments tentatively classified "wild" because they would be managed as VRM Class I. The scenic ORV values associated with East Fork Virgin River (segment 36-37) would indirectly be protected by the VRM Class I associated with the Parunuweap WSA. Restrictions associated with VRM Class I would preserve the natural appearance of these areas, providing protection to the tentative classifications and ORVs of the segments by restricting actions that could potentially cause impacts on the segments. The only segment not managed as VRM Class I would be Three Mile Creek. However, because fewer restrictions are placed on "recreational" segments and mitigation measures would be implemented to aid in protecting the fish ORV, impact on the segment's tentative classification or ORV is not expected.

Non-WSA Lands with Wilderness Characteristics

There is 610 acres of overlap with WC areas, with five suitable segments tentatively classified "wild," and the management of each of these areas is duplicative of WSR management. Therefore, there are no additional impacts or protections from this overlap.

Recreation

Compared to Alternative A, suitable WSRs would receive indirect protection from more recreation management associated with the establishment of SRMAs. Under Alternative C, 13 of the 15 suitable segments are located within five of the SRMAs. Management associated with the SRMAs provides additional protection to the tentative classifications and ORVs of the suitable segments. The Three Mile Creek and Deep Creek segments would not receive the same indirect protections from management associated with SRMAs because the segments would not be located within an SRMA.

Transportation

Limiting OHV use to designated routes along the East Fork Virgin River segment tentatively classified "recreational" would be compatible with the classification. Limiting OHV use to designated routes along the East Fork Virgin River segment 37-40a would allow OHV use along a route that parallels the river for approximately one mile (approximately 20% of the length of the segment). The remainder of the "wild"

segments' corridors would be closed to OHV use and would not be impacted. Restrictions on OHV use within suitable segments would provide indirect protections to the segments' ORVs, particularly scenic and wildlife, by restricting use that may reduce the natural character of the area or cause displacement of wildlife.

Lands and Realty

Lands and realty management actions would be more protective of ORVs than Alternative A due to excluding new ROWs in suitable corridors with a tentative classification of "wild" and in the East Fork Virgin River segment tentatively classified as "recreational." This would preclude these surface disturbing and potentially visually obtrusive activities that could potentially impact the segments' ORVs.

Minerals and Energy

No impacts on the tentative classification or ORVs of the 15 suitable segments would occur because there are no existing leases located within the segment corridors and because mineral resources would be managed in ways consistent with protection of the tentative classifications and ORVs or are within WSA boundaries where additional protections are provided.

ACECs, WSAs, Wilderness

Benefits to WSR values related to the management of ACECs, WSAs, and wilderness would increase compared to Alternative A due to finding six "wild" segments suitable in the Cottonwood Canyon area where there is an ACEC designated under Alternative C. As a result, a larger percentage of the suitable segments would receive indirect protections from management associated with ACEC management. Table 4-29 identifies segments that are located within these areas.

Table 4-29. Alternative C Suitable Segments Coinciding with ACECs, WSAs, or Wilderness Area

Suitable Segment	Acres within ACEC	Acres within WSA	Acres within Wilderness
North Fork Virgin River	-	North Fork Virgin River (200 acres, 46% of corridor)	-
East Fork Virgin River (Segment 37-40)	Parunuweap Canyon (570 acres, 60% of corridor)	Parunuweap (960 acres, 100% of corridor)	-
East Fork Virgin River (Segment 40a-41)	Parunuweap Canyon (700 acres, 91% of corridor)	Parunuweap (770 acres, 100% of corridor)	-
East Fork Virgin River (Segment 36-37)	-	Parunuweap (750 acres, 100% of corridor)	-
Orderville Gulch	-	Orderville (500 acres, 84% of corridor)	-
Meadow Creek/Mineral Gulch	Parunuweap Canyon (1,540 acres, 88% of corridor)	Parunuweap (1,570 acres, 89% of corridor)	-
Deep Creek	-	-	-

Suitable Segment	Acres within ACEC	Acres within WSA	Acres within Wilderness
Cottonwood Creek	Cottonwood Canyon (280 acres 100% of corridor)	Moquith Mountain (20 acres, 9% of corridor)	-
Indian Canyon	Cottonwood Canyon (20 acres, 14% of corridor)	Moquith Mountain (20 acres, 17% of corridor)	-
South Fork Indian Canyon	Cottonwood Canyon (130 acres, 29% of corridor)	Moquith Mountain (450 acres, 100% of corridor)	-
North Branch of South Fork Indian Canyon	Cottonwood Canyon (40 acres, 48% of corridor)	Moquith Mountain (90 acres, 100% of corridor)	-
Water Canyon	Cottonwood Canyon (600 acres, 84% of corridor)	Moquith Mountain (710 acres, 100% of corridor)	-
Hell Dive Canyon	Cottonwood Canyon (175 acres, 50% of corridor)	Moquith Mountain (310 acres, 88% of corridor)	-
Paria River	-	-	Paria Canyon-Vermilion Cliffs (1,020 acres, 100% of corridor)
Three Mile Creek	-	-	-

Alternative D

Under Alternative D, none of the eligible river segments would be designated and managed as suitable for inclusion in the NWSRS. Therefore, the BLM would no longer provide any direct protections to the segments' ORVs or tentative classifications. Any protections afforded these values would occur indirectly from management actions associated with other resources. Examples of such indirect protections could include management associated with WSA or various forms of restrictions placed on surface disturbance activities associated with resource management. Because no direct protections would be afforded to eligible segments, there is a potential that impacts could occur on the ORVs (impacts on each ORV are presented under their respective resources) and tentative classifications that could be severe enough to preclude them from future WSR consideration.

Summary

Impacts on the tentative classification of eligible and suitable segments would primarily occur to "wild" segments from increased access to river corridors associated with OHV designations. This impact would be most pronounced under Alternative A where there are fewer restrictions on OHV use while impacts would be less under Alternatives B and C where the majority of the segments would be located within WSAs and OHV restrictions are in place. Impacts on eligible and suitable segments' ORVs would primarily occur from surface disturbing activities that would impact the scenic quality of the area and in some instance cause impacts on fish, wildlife, and recreational values. Again, such impacts would occur more under Alternative A because of fewer restrictions, while under Alternatives B and C the potential

for impacts would decrease because of indirect protections from management of other resources (e.g., soil, water, fish and wildlife, and special status species) and ACEC, WSAs, and wilderness. Additional protections also would be afforded by the tentative classifications and ORVs of segments from SRMA management.

Under Alternatives B and D, by not managing all eligible segments in a protective manner there is a potential that impacts could occur to the ORVs and tentative classifications that could be severe enough to preclude them from any future opportunities for WSR consideration. Any protections for these values would be an indirect result of management of other resources such as WSAs.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Based on their location and management of other resources, uses, and designations, impacts on WSRs are not irreversible or irretrievable. There will be no loss of long-term productivity due to short-term uses proposed in the alternatives. None of the activities proposed in this EIS will produce unavoidable adverse impacts on WSRs.

4.4.3 Impacts on Wilderness

This section discusses potential impacts on the portions of the Paria Canyon-Vermilion Cliffs Wilderness within the decision area from management noted in Chapter 2. Wilderness areas are managed according to the Wilderness Act to preserve their wilderness characteristics (i.e., solitude, naturalness, and primitive/unconfined recreation). As such, the BLM cannot allow activities to occur within wilderness areas that would affect their wilderness characteristics. This section focuses on impacts on wilderness characteristics within the designated wilderness area. Because there are no existing mineral leases located within the wilderness area and Congress has closed wilderness areas to mineral development, wilderness characteristics are primarily influenced by the volume and density of recreational users and range and wildlife management projects. These impacts normally come from vegetation treatments, and the installation, maintenance, and use of range/wildlife improvements allowed under the Wilderness Act and Congressional Wilderness Grazing Guidelines.

The analysis is based on the following assumptions:

- Any new surface disturbing activities proposed would be subject to NEPA analysis and the minimum tool requirement.
- Activities proposed that would not initially meet wilderness objectives for the area would be mitigated to the extent possible to meet the objectives. Activities that could not be mitigated may not be authorized.
- Some proactive restoration of areas that do not meet desired wilderness objectives may be completed each year.

Under all alternatives impacts on wilderness are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, soil resources, water resources, cultural resources, paleontological resources, forestry and woodland products, lands and realty, minerals and energy, ACECs, WSRs, WSAs, and other designations.

Impacts Common to All Alternatives

Wilderness Management

Managing the Paria Canyon-Vermilion Cliffs Wilderness to protect wilderness characteristics would protect wilderness values through application of the minimum tool analysis for all surface disturbing activities. Implementation of the Wilderness Management Plan allows for periodic adjustments to site-specific management in order to ensure wilderness characteristics are preserved.

Visitors may have outstanding opportunities for solitude or primitive and unconfined recreation when the sights, sounds, and evidence of other people are rare or infrequent and where visitors can be isolated and alone or secluded from others. High concentrations of recreation users (large group sizes and/or frequent group encounters) would decrease outstanding opportunities for solitude in wilderness. Continuing the current group size and visitor use limits required for use in the Paria Canyon, subject to adaptive management decisions deemed necessary through monitoring and evaluation of resources and social conditions, would preserve opportunities for solitude.

Continuing to manage the wilderness area as VRM Class I and closed to OHV use and all motorized and mechanized vehicles, with no designated routes, would preserve wilderness character from these potentially intrusive activities. In accordance with Section 4(d) of the Wilderness Act, exceptions to exclusions on motorized and mechanized vehicles could result in a short-term detraction from the natural character of the area. In addition, there is a potential for a short-term elimination of solitude and

naturalness from increased sights and sounds associated with the use of equipment and mechanical transport. These impacts would be uncommon and short term in nature, if they do occur.

Wildland Fire Suppression

Wildland fire suppression tactics and ESR activities following fire events could result in a short-term loss of solitude related to the presence of personnel to implement the activity; however, over the long term vegetation in the area would appear natural, providing a diverse and desirable vegetative cover. These activities would take into account existing wilderness characteristics of the area, the need to prevent impairing actions, historic fire occurrence, natural role of fire, proposed degree of suppression, smoke management, the use of natural firebreaks, adequate buffer zones, etc. Adherence to resource protection measures while implementing wildland fire activities would limit intrusion on wilderness characteristics to the extent possible while protecting human life. The vegetation in the wilderness area is not adapted to frequent wildland fires; the potential for impacts from wildland fire activities would be low.

Livestock Grazing

Livestock grazing could have a perceived impact on wilderness character. Primitive recreational experiences could be impacted by the presence of livestock in a wilderness setting. Areas frequented by livestock, such as springs or water developments, could have a perceived unnatural appearance to some wilderness users. It should be noted that livestock seen in Paria Canyon generate some visitor comments on the trailhead comment form. Maintenance of range improvements allowed by the Wilderness Act and Congressional Wilderness Grazing Guidelines could result in short-term impacts on solitude and naturalness.

Alternative A

Vegetation manipulation projects, whether to restore ecological function, reduce hazardous fuels, improve habitat, or reduce invasive species, would be under the minimum tool requirement, and direct impacts likely would be localized and short term. Solitude experienced by recreational users could be reduced in the short term while the treatment is implemented. Over the long term, naturalness would remain unchanged; the magnitude of this restoration would depend on the type and scope of vegetation restoration. All impacts would be localized, and over the long term naturalness would be enhanced by restoring natural vegetation structures and patterns.

Alternative B

Minimizing change on the landscape would preserve the characteristic landscape; be in compliance with the Wilderness Act; and continue to maintain naturalness, solitude, and opportunities for primitive recreation while implementing other management actions. In addition, consideration of soundscapes would protect the perception of solitude, maintaining or restoring the natural quiet of the area.

Implementing adaptive management principles to regulate group size based on the monitoring of the wilderness area resources and social conditions would mitigate impacts on solitude associated with increased recreation use. Indirect impacts on the wilderness area also would occur from establishing the Paria Canyon SRMA, which would implement management consistent with wilderness policy. In addition, supporting Tread Lightly and Leave No Trace programs throughout the decision area would reduce impacts on designated wilderness as recreation users recreate in a manner that leaves fewer long-term impacts.

Vegetation manipulation projects, whether to restore ecological function, reduce hazardous fuels, improve habitat, or reduce invasive species, would be under the minimum tool requirement, and direct impacts

likely would be localized and short term. Allowing the full suite of restoration tools (chemical, biological, mechanical, fire, natural processes) would allow the broadest approach to controlling invasive species and restoring ecological function. Solitude experienced by recreational users could be reduced in the short term while the treatment is implemented. Over the long term, naturalness would remain unchanged; the magnitude of this restoration would depend on the type and scope of vegetation restoration. All impacts would be localized, and over the long term naturalness would be enhanced by restoring natural vegetation structures and patterns. While allowing the broadest range of treatment methods could increase short-term impacts compared to Alternative A, the long-term restoration of natural function could occur in more areas and in a shorter time period.

Alternative C

Impacts from wilderness and recreation management would be the same as Alternative B.

Vegetation manipulation projects, whether to restore ecological function, reduce hazardous fuels, improve habitat, or reduce invasive species, would be under the minimum tool requirement, and direct impacts likely would be localized and short term. Solitude experienced by recreational users could be reduced in the short term while the treatment is implemented. Limiting treatment methods to prescribed fire and other natural functions would reduce the short-term impacts from vegetation treatments compared to Alternatives A, B, and D. However, over the long term the natural functions of the wilderness area could decrease from lack of opportunities to manage noxious and invasive species with the most effective treatment methods.

Alternative D

Impacts would be the same as Alternative B.

Summary

Wilderness characteristics in the Paria Canyon-Vermilion Cliffs Wilderness would generally be protected due to management associated with the wilderness alternatives. There is a potential for long-term impacts on naturalness in Alternative C due to restricting the methods available to restore ecological function. Alternative A, B and D could result in short-term loss of solitude during vegetation treatments, but over the long-term naturalness would be restored. There also could be some loss of naturalness from the presence of livestock grazing as allowed by the Wilderness Act and Congressional Wilderness Grazing Guidelines in all alternatives; however, the level of impact would be based on individual perception.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources. No short-term uses would be permitted if they resulted in the long-term impairment of wilderness characteristics. Due to application of the minimum tool requirements, there would be no unavoidable adverse impacts.

4.4.4 Impacts on Wilderness Study Areas

Under BLM policy, WSAs are managed according to the IMP to protect the area's identified wilderness characteristics until such time that Congress acts on BLM 1992 recommendations. The IMP provides direction for managing other resource uses within WSAs. Any management schemes considered in this RMP must be within the parameters provided by the IMP.

WSAs will continue to be managed to the non-impairment standard, and as such the BLM cannot allow activities to occur within WSAs that would impair their suitability for preservation as wilderness. Therefore, significant impacts on WSAs (i.e., impairment) would not occur under any of the alternatives. Although impacts on natural resources within WSAs would occur from a variety of uses, they would be non-impairing and therefore would not result in long-term impacts on the wilderness characteristics of the WSAs. Some uses that could not take place in a WSA may be permitted under the IMP because they are only temporary uses that do not create surface disturbance or involve permanent placement of structures.

The analysis is based on the following assumptions:

- Managing WSAs according to the IMP will protect the wilderness characteristics of WSAs in a manner that will not "impair the suitability of such areas for preservation as wilderness" (FLPMA Section 603(c)).
- Management actions that enhance biological or environmental characteristics would improve the wilderness quality and suitability of the WSAs.

Under all alternatives, impacts on WSAs are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, cultural resources, paleontological resources, forestry and woodland products, lands and realty, minerals and energy, ACECs, WSRs, wilderness, and other designations.

Impacts Common to All Alternatives

Wildland Fire and Suppression

During and immediately after fire events, access to WSA areas and enjoyment of opportunities for primitive recreation associated with them may be restricted or impaired. Full suppression of wildland fires in these areas may be implemented to control fire size and severity, protecting these opportunities.

Wildfire suppression activities could result in short-term impacts, including disturbance to soils, surfaces and groundwater, watershed functions, and vegetation conditions. Impacts would be minimized by post-fire rehabilitation efforts. Appropriate management response within WSAs could limit the use of mechanical suppression activities or other techniques for reducing these impacts. Temporary disturbances may occur to resources and values; however, these effects would be short term while wilderness values are assessed on a long-term scale.

Long-term impacts associated with the use of an appropriate management response to wildfire suppression, wildland fire use, and the planned actions of prescribed fire and non-fire fuel treatments on WSAs are the decreased risk of large severe wildfire events. With the removal of hazardous fuels, a trend increasing the preservation of naturalness and opportunities for primitive recreation would be in place. Because fire is a part of the natural environment, the WSAs' natural character would not only be protected, but also likely enhanced.

Livestock Grazing

Livestock grazing could have a perceived impact on wilderness character. Primitive recreational experiences could be impacted by the presence of livestock in a wilderness setting. Areas frequented by livestock, such as springs or water developments, could have a perceived unnatural appearance to some wilderness users. It is important to note that the steep canyon topography in many of the WSAs makes livestock access difficult in some areas. While recreational use is commonly concentrated in the canyons, livestock use is generally outside these areas, reducing potential impacts.

Maintenance of range improvements allowed by the IMP could result in short-term impacts on solitude and naturalness; however, long-term impacts would be required to meet the non-impairment criteria. Using livestock grazing to enhance the ecosystem health and/or help accomplish resource objectives, such as noxious and invasive weed control and hazardous fuel reduction, could beneficially impact the naturalness of the wilderness area by reducing opportunities for noxious and invasive weed infestation and limiting the potential for severe fire damage.

Changes in Vegetation (Vegetation Restoration, Habitat Manipulation, Fuels Treatments)

Decisions associated with soil, water, fish and wildlife, livestock grazing, vegetation, wildland fire ecology, and special status species alternatives that result in direct changes to vegetation—whether intended to enhance, protect, and restore habitat; reduce soil erosion; increase livestock forage; or restore ecological functions—may be implemented in WSAs, but could be limited to protect the wilderness characteristics. Site-specific treatment actions would go through environmental planning and review to analyze potential impacts on naturalness and opportunities for primitive recreation and solitude. There could be impacts on solitude from increased sights and sounds associated with the vegetation treatments and from the evidence of other people assisting in management activities. Depending on the magnitude and duration of the task, there could also be impacts on the natural character of the area associated with habitat management. Over the long term, vegetation and fuels treatments would help maintain the naturalness of WSAs by bringing the fire regime condition class to a point allowing fire to play its natural role in the ecosystem. Any proposals would be considered on a case-by-case basis and must enhance wilderness characteristics in order to be permitted.

Alternative A

Motorized Use of Routes (Inventoried Ways)

Allowing motor vehicle use along 32 miles of designated routes (inventoried ways) within the Parunuweap and Moquith Mountain WSAs could impact recreation users' perception of opportunities for solitude and primitive recreation. The appearance of naturalness within WSAs would be temporarily reduced by any signs and barricades that may be needed to keep vehicles on existing routes (inventoried ways). Such structures would be temporary, limited to the routes (inventoried ways), and would not affect the WSA as a whole. In addition, the sound and presence of OHV users would reduce non-motorized recreation users' perception of opportunities for solitude and primitive recreation. When the OHV user passed beyond sight and hearing range, opportunities for solitude and primitive recreation would return and natural soundscapes would be restored.

Limiting OHV recreation use to these designated routes (inventoried ways) could minimize disturbance of adjacent lands, protecting the natural character of areas adjacent to these routes. However, with vehicle use of inventoried routes (inventoried ways) continuing in the WSAs, there is greater risk that users will inappropriately leave the routes and form new trails, which could impair wilderness suitability. Therefore, under Alternative A, motorized use would be actively monitored by the BLM, and any traces resulting from inappropriate vehicle use off of existing routes (inventoried ways) would be immediately removed so that new OHV trails do not form. OHV use would be conditional and would not be allowed to expand

beyond these routes (inventoried ways) or further impact the natural character of the WSAs. Because impacts would be short term and localized, no lands within these two WSAs would be disqualified from consideration as wilderness by Congress. Not designating any routes (inventoried ways) in the other three WSAs would maintain their wilderness characteristics.

The above impacts could also occur within the sand dunes portions of the Moquith Mountain WSA that are open to cross-country OHV use (730 acres). The shifting nature of the sand dunes would result in no long-term impacts on naturalness, but there could be short-term loss in the perception of opportunities for solitude and primitive recreation when OHV use occurs on the dunes.

Recreation

Visitors may have outstanding opportunities for solitude or primitive and unconfined recreation when the sights, sounds, and evidence of other people are rare or infrequent; where visitors can be isolated, alone, or secluded from others; where the use of the area is by non-motorized, non-mechanical means; and where no or minimal developed recreation facilities are encountered. High concentrations of recreation users (large group sizes and/or frequent group encounters) would decrease outstanding opportunities for solitude in WSAs. Continued increases in non-motorized recreation users accessing Zion National Park through the Orderville Canyon and North Fork Virgin River WSAs would reduce opportunities for solitude in these areas. In addition, large numbers of recreationists in WSAs, especially in the narrow canyons associated with the WSAs noted above, would increase the impact on campsites, decreasing the naturalness of WSAs in specific locations. Increasing use of campsites results in increased areas of compacted soils, reducing vegetation and creating unnatural openings in the vegetation. Human waste and trash also increase, especially when campsites are located in confined areas such as canyons.

Use of wheeled game carriers in WSAs could impact short-term naturalness and solitude. When the users of the wheeled game carriers leave, the impacts would end. In addition, not considering night skies or soundscapes in implementation planning could result in long-term perceived decreases in naturalness within WSAs.

Visual Resources Management

Although the IMP prevents the impairment of wilderness values, it allows some modifications to the natural character of the area if modifications are found not to impair or because of valid rights, grandfathered activities, safety considerations, or other reasons. Managing WSAs as Class II (30,900 acres), Class III (300 acres), and Class IV (22,700 acres) could result in some modifications to natural character within the WSAs that could attract the attention of viewers. This would mostly be the case in the Class IV areas outside the canyons (Map 2-5). Due to the non-impairment standard, impacts that could exceed the standard would not be allowed, regardless of the VRM objective.

Alternative B

Motorized Use of Routes (Inventoried Ways)

Impacts from allowing motor vehicle use along designated routes (inventoried ways) within the Parunuweap and Moquith Mountain WSAs would decrease compared to Alternative A because 17 miles of routes (inventoried ways) in these areas would be closed to motorized use. Compared to Alternative A, the short-term impacts from OHV use on opportunities for solitude and primitive recreation would be eliminated along and adjacent to these routes (inventoried ways). OHV use along the remaining 15 miles of designated routes (inventoried ways) could result in the same type of impacts noted in Alternative A.

Recreation

The intensity of impacts from recreation use within WSAs in Alternative A would decrease based on limiting group sizes associated with SRPs within WSAs to 12 people, protecting opportunities for solitude and primitive unconfined recreation. These impacts would be most evident in the areas currently receiving high levels of use, such as the North Fork Virgin River, Orderville Canyon, and Parunuweap Canyon WSAs. However, reducing group sizes in the face of increases in the number of groups could result in a continuation of the existing levels of impact. In addition to the reduction in the number of users, supporting education and outreach programs such as Tread Lightly and Leave No Trace would reduce impacts from increasing numbers of overnight users as campers recreate in a manner that leaves fewer impacts.

Precluding use of wheeled game carriers would eliminate the short-term impacts noted in Alternative A, preserving naturalness and solitude. In addition, considering night skies and soundscapes in site-specific planning would preserve the natural character of the WSAs.

Visual Resources Management

VRM Class I objectives would support the IMP guidelines to not impair the natural character of the existing landscape. The objective of VRM Class I is to preserve the existing character of the landscape. While the VRM objective provides for natural ecological changes, level of change to the landscape should be very low and must not attract attention. The IMP prevents the impairment of wilderness values, but allows some modifications to the natural character of the area if modifications are found not to impair or because of valid rights, grandfathered activities, safety considerations, or other reasons. In such cases, managing the WSAs as VRM Class I complements the IMP by providing techniques to ensure that potential changes are designed not to attract attention, protecting naturalness, opportunities for solitude, and primitive recreation.

Alternative C

Motorized Use of Routes (Inventoried Ways)

Compared to Alternative A, impacts on WSAs from way designation and OHV use would be eliminated due to closing all OHV routes (inventoried ways) within WSAs. In addition, closing the Moquith Mountain SRMA Dunes RMZ to cross-country OHV use would eliminate short-term impacts noted in Alternative A, preserving opportunities for solitude and primitive recreation.

Recreation

The intensity of impacts from recreation use within WSAs in Alternative B would decrease based on limiting group sizes to eight within protected and restricted Mexican spotted owl habitat and increasing protections on opportunities for solitude and primitive unconfined recreation (within the Orderville Canyon, North Fork Virgin River, and western portions of the Parunuweap Canyon WSAs). However, reducing the groups size could also result in a fewer opportunities for recreationists to access these areas. Restriction on group size could also result in an increase in the number of smaller groups in the area. Reducing group sizes in the face of increases in the number of groups could result in a continuation of the existing levels of impact.

Visual Resources Management

Impacts from visual resources would be the same as Alternative B.

Alternative D

Motorized Use of Routes (Inventoried Ways)

Impacts from route (inventoried ways) designation and OHV use would be the same as Alternative A.

Recreation

The intensity of impacts from recreation use within WSAs in Alternative B could increase due to increasing group sizes associated with SRPs within WSAs to 20, which could result in the temporary loss of opportunities for solitude or unconfined recreation for users from other groups. Long-term loss of naturalness associated with impacts on campsites due to increasing group sizes would be less than Alternative A due to supporting education and outreach programs such as Tread Lightly and Leave No Trace, which would reduce impacts from increasing numbers of overnight users as campers recreate in a manner that leaves fewer impacts.

Visual Resources Management

Impacts from visual resources would be the same as Alternative B.

Summary

Wilderness characteristics within WSAs would be protected under all alternatives. There could be short-term loss of perceived naturalness and opportunities for primitive recreation due to OHV use along designated routes (inventoried ways) and in the Moquith Mountain sand dunes area under Alternatives A, B, and D, but there would be no long-term impacts.

Under Alternative A there could be short-term impacts on opportunities for solitude from the increasing presence and numbers of encounters with other visitors to the WSAs, specifically those that boarder Zion National Park. There could also be long-term impacts from increasing non-motorized recreation use associated with camping in these areas. Under Alternatives B, C, and D, these impacts would decrease due to limitations on group size associated with SRPs permitted in these areas, although increases in the number of groups could result in a continuation of the existing levels of impact. The greatest reduction would be under Alternative C due to additional limitations associated with special status species management.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources. No short-term uses would be permitted if they resulted in the long-term impairment of wilderness characteristics. Due to application of the non-impairment standard, there would be no unavoidable adverse impacts.

4.4.5 Impacts on Other Designations

This section addresses impacts on other designations, including National and State Scenic Byways and Backways and the Old Spanish National Historic Trail. No alternative proposes a BLM Backcountry Byway, which is the only byway or backway designation administered and managed by the BLM. Therefore, the only impact on byways and backways is associated with the BLM's responsibility to coordinate with the various state and national organizations that designate and administer the byways and backways noted in Chapter 3. The impacts of the decisions related to these byways and backways will be addressed in the cumulative impact analysis.

The analysis is based on the following assumptions:

- Existing development along the two segments of the Old Spanish National Historic Trail within the decision area has removed actual trail tread or associated sites.
- Mineral development in the Old Spanish National Historic Trail corridor would be limited to mineral material sites (sand or gravel) or minor hard rock development.

Under all alternatives, impacts on other designations are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, soil resources, water resources, vegetation, special status species, fish and wildlife, wildland fire ecology, cultural resources, paleontological resources, forestry and woodland products, livestock grazing, recreation, lands and realty, ACECs, WSRs, wilderness, and WSAs.

Impacts Common to All Alternatives

Old Spanish National Historic Trail Management

Coordinating management of the Old Spanish National Historic Trail with the National Park Service (NPS) and other BLM offices would assist in providing consistent management throughout its extent, preserving the values for which it was designated.

Alternative A

Old Spanish National Historic Trail Management

Due to the degree of existing development along the Highway 89/20-Garfield County segment (e.g., U.S. Highway 89, SR 20, private farms, and utility ROWs) and the lack of identified trail tread, impacts would largely be associated with highly visible developments within the corridor and viewshed beyond the extent present. Alteration of the trail corridor or associated resources could impact the character and historic setting of the Old Spanish National Historic Trail.

In addition, lack of interpretation along the Highway 89/20-Garfield County segment and the Highway 89-Kane County segment could result in the public being unaware of these resources or their significance.

Actions that Result in Visible Changes to the Trail Corridor

Managing most of the trial corridor as VRM Class IV would allow changes to the landscape that could alter the existing condition of the landscape. Such changes would be beyond the historical and present landscape character associated with the corridor.

Allowing cross-country OHV use in the areas surrounding both segments of the Old Spanish National Historic Trail could result in route proliferation. This would change the existing character of the

landscape by increasing linear disturbances on the low hillsides, changing the visual lines in the landscape from its condition at the time of historic use.

Development of minerals (hard rock quarries, mineral material pits, locatable mineral developments, and oil and gas wells) within view of U.S. Highway 89 would impact the existing character of the landscape associated with the Highway 89/20-Garfield County segment. While these areas would be small in size, the contrast in color and shape from the existing landscape could draw attention of the viewer. This could decrease the existing character of the landscape associated with this segment of the Old Spanish National Historic Trail. However, the prevalence of hill-cuts associated with U.S. Highway 89 would decrease the impact of new mineral material pits because the existing hill cuts already represent modifications on the landscape; the addition of a small number of mineral developments that mimic the existing hill-cut modifications would not result in a significant change to the landscape.

Alternative B

Old Spanish National Historic Trail Management

Due to the degree of existing development along the Highway 89/20-Garfield County segment (e.g., U.S. Highway 89, SR 20, private farms, and utility ROWs) and the lack of identified trail tread, impacts would largely be associated with highly visible developments within the corridor and viewshed beyond the extent present. Managing for VRM objectives would help to maintain the landscape associated with the Old Spanish Trial.

Providing interpretive opportunities for both segments of the Old Spanish National Historic Trail would increase public appreciation for the trail's values and significance in the region and in the Nation's history. Increased public appreciation could lead to increased user stewardship, appreciation, and protection of the corridor.

Actions that Result in Visible Changes to the Trail Corridor

Managing northern portions of the Highway 89/20-Garfield County segment as VRM Class II would maintain the existing landscape with minimal changes. While existing development has changed the landscape from its condition at the time of trail use, this management would maintain the portions of the corridor most similar to the historical conditions. Managing the visual resources in the southern portions of this segment's corridor, which have been more altered by existing development and landscape alteration, as VRM Class III and IV would allow for continued changes to the landscape. Over the long term, this could affect the landscape associated with this portion of the trail.

Managing the few parcels of public land along the Highway 89-Kane County segment as VRM Class IV could allow changes to the landscape. The level of current visual changes to this portion of the trail is consistent with this designation.

Route designations surrounding both segments would maintain the existing character of the landscape without allowing extensive new routes. This would maintain the existing character of the landscape in these areas.

The magnitude and intensity of the impacts from mineral development in Alternative A would decrease based on increased VRM stipulations on the northern portion Highway 89/20-Garfield County segment in the decision area (VRM II), which would reduce the potential for the noted impacts.

Alternative C

Impacts from all impact categories/sources would be the same as Alternative B.

Alternative D

Impacts from all impact categories/sources would be the same as Alternative B.

Summary

Under Alternative A, the lack of any specific management for either segment of the Old Spanish National Historic Trail could result in alteration of the trail corridor or associated resources could impact the character and historic setting of the trail. Under Alternatives B, C, and D, management would provide for consideration of the historic values present along the corridor and the subsequent developments that have occurred. In addition, the action alternatives provide for coordination and interpretative efforts to increase public appreciation for the trail's values and significance in the region and Nation's history.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

There would be no irreversible and irretrievable commitment of resources associated with other designations. There will be no loss of long-term productivity or condition of other designations due to short-term uses proposed in the alternatives. None of the activities proposed in this EIS will produce unavoidable adverse impacts on the other designations.

4.5 SOCIAL AND ECONOMIC

This section is subdivided into three general areas:

- Impacts on social and economic conditions
- Impacts on tribal interests
- Impacts on public safety.

4.5.1 Impacts on Social and Economic Conditions

This section describes potential social and economic impacts from management actions. Such impacts may result from specific individual management actions, but also and often reflect the collective effect of a number of actions under a particular alternative. Thus, this section presents impacts from the specific management actions of various resource programs and alternatives on the local economy, population, community services, public finance, and social customs and culture. Environmental justice, a BLM critical element, is also addressed.

Potential economic impacts include changes in employment, income, business costs, and tax revenue to local, state and Federal Government entities. Changes in employment and income can then cause indirect socioeconomic impacts, such as changes in population, which can lead to community impacts on housing, infrastructure, and other government services. These economic impacts may then produce social impacts, such as changes in community structure as new people move in to take new jobs. Changes in management of resources under all alternatives also can have direct social impacts on residents and visitors, affecting livelihoods, lifestyles, attitudes, opinions, quality of life, and social structures.

The socioeconomic impact analysis and conclusions are based on BLM knowledge of resource uses in the project area; review of existing literature; and information provided by BLM specialists, local and state cooperating entities, and industry contacts. Impacts are quantified where possible and described in qualitative terms in the absence of reliable quantitative data. The analysis of socioeconomic impacts is intended to capture the most notable, overall socioeconomic impacts under each alternative, and cannot address all potential impacts.

Economic Impact Analysis Approach and Quantitative Results

Economic impacts can be described qualitatively, and in certain cases where adequate data exists they can be quantified. Qualitative impact analysis involves identifying the most likely direction of change in economic conditions resulting from a particular management action or a set of management actions expected to have similar effects. For example, based on the type of action, a likely increase or decrease in production values or costs for certain producers may be identified, or an increase or decrease in tourist expenditures in the planning area may be deemed likely. These determinations are based on experience in the local area or other, similar areas and professional judgment. The results of all qualitative impact analyses are presented below for each alternative.

Quantitative economic impact analysis requires that sufficient information exists to quantify current conditions or a change in the value of production or in costs or expenditures resulting from a specific management action or set of actions. Where sufficient data exists, these changes in value or costs can then be analyzed with an economic model to estimate likely changes in employment and income. In other cases, employment and income effects cannot be quantified, but the basic data on costs and values can be presented.

This section details the approach used for each quantitative economic impact analysis. Descriptions of the approach and relevant data are presented first for each sector for which quantification of employment and income impacts was possible. Next, the approach for additional sectors for which a simple cost and value analysis was possible is presented. Then the quantitative results are presented. It is most efficient to present the quantitative results together with the methodology discussion and to provide tables showing quantitative results in one section so that differences between the alternatives can easily be seen.

Employment and income impacts are estimated in this study with the IMPLAN computer model (IMPLAN version 2.0.1025). IMPLAN is a regional economic impact model that provides a mathematical accounting of the flow of dollars and commodities through a region's economy. The region, or socioeconomic study area, for economic impacts in this study is Garfield and Kane counties.

The IMPLAN model requires inputs of impacts on an industry or industries in the study area, in terms of changes in the value of production or expenditures. These changes in value or cost require data and assumptions specific to the study area. Information from various sources regarding current management strategies and uses and how these uses may change under each alternative provides physical, quantitative measures of impacts (e.g., tons of coal produced, number of gas wells drilled and completed, and AUMs). Information from various other sources provides unit values and unit costs. Table 4-30 summarizes the primary data and sources used to estimate value and cost inputs for the IMPLAN model for those resource uses for which quantification of employment and income impacts is possible.

Table 4-30. Data Types and Sources for Sectors for Which Quantification of Employment and Income Impacts Is Possible

Resource Use	Required Data	Data Sources
Oil and Gas Drilling and Production	• Number of wells to be drilled • Success ratios • Drilling and completion costs • Production costs • Expected proportion of costs incurred locally	• Utah Geological Survey • U.S. Department of Energy • Interviews with Utah oil and gas companies • BLM, including RFD scenario • Kanab Draft RMP/EIS Alternatives
Coal	• Historical and forecasted prices • Projected tonnage per year	• Utah Geological Survey • U.S. Department of Energy • Interviews with Utah coal companies • BLM, including RFD scenario • Kanab Draft RMP/EIS alternatives
Grazing	• Historical allocated AUMs for livestock within the decision area • Historical livestock prices • Allocated AUMs under each Draft RMP/EIS alternative	• BLM • Utah agriculture statistics • Kanab Draft RMP/EIS alternatives

For each resource use, future economic activity is dependent on a variety of factors beyond the control of the BLM. For instance, the extent, pace, and timing of energy development activities depend on national and international energy demand and prices, production factors within each industry, and business strategies of operators. Because the pace of energy development in the planning area is unknown, a constant rate of production is assumed in this analysis for coal production and oil and gas drilling and

production. Likewise, use of livestock AUMs is assumed to be constant throughout the study period based on the AUM allocations for each alternative. Actual economic impacts may vary if the rate of production in any of these industries changes over the study period.

The specific approach to use of the data outlined in Table 4-30 is detailed below. This data is used to determine primary impacts, in terms of changes in the value of production or in expenditures. These primary impacts serve as the inputs into the IMPLAN model to analyze the total economic impact of each alternative. The total economic impact includes the following changes in income and employment:

- Direct impacts are the employment and income directly supported by the industry in question (e.g., coal).
- Indirect impacts are the employment and income generated by industries (e.g., trucking) that support the subject industry (e.g., coal).
- Induced impacts are the employment and income generated as a result of household expenditures supported by income from the industry in question (e.g., spending of labor income from the coal industry).

Employment figures in the results below represent total employment. IMPLAN does not distinguish between full-time and part-time jobs.

Coal Production Economic Impact Analysis Methodology

Based on the RFD, the production of coal is expected to commence within the life of the RMP. A coal company is taking necessary actions to begin coal mining activity on the Alton coal field. Once initiated, coal mining is expected to continue for many years in the future. The Alton coal field falls partially within the Draft RMP/EIS decision area and is addressed in this document in Chapter 2 and in the unsuitability report (Appendix F). According to the RFD, coal production is expected to begin on private mineral-owned lands and then transition to the adjacent decision area lands.

According to the RFD, a coal company plans to mine at least 40 million tons of coal. For the purposes of the economic impact analysis, it was assumed that this amount will be mined over 20 years, at a constant rate of 2.0 million tons per year, beginning in 2010. Based on the private-to-federal landownership ratio for the mine stated in the RFD (570 and 1,430 acres, respectively), it was assumed that mining from the decision area federal mineral estate will begin in 2010, with 1.43 million tons mined from the decision area annually. The economic impact of additional coal production from private land, 0.57 million tons per year, is addressed in the cumulative impacts section.

The value of coal production within the decision area was estimated by applying an annual price forecast per short ton to the annual production rates stated above. The average forecasted price was obtained from the U.S. Energy Information Administration (2006) and represents the average forecasted minemouth price for the United States over the period 2003 through 2030. Table 4-31 summarizes the production and price assumptions for coal mining over the 20-year time period. The economic contribution of this activity in terms of jobs and earnings was estimated by running the forecasted value of coal production through IMPLAN Sector 20, Coal Mining for Garfield and Kane counties, which constitute the socioeconomic study area.[1] An economic profile of this sector based on IMPLAN data for Emery and

1 *IMPLAN allows impacts on be estimated in two ways. First, if the total value of output is known or estimated, this value can be run through IMPLAN in the specific industry being evaluated. For instance, the economic contribution of the coal industry to Garfield and Kane counties can be estimated by running the total value of production through IMPLAN Sector 20, Coal Mining. Economic contributions can also be estimated using IMPLAN by examining the direct expenditures needed to produce a good or service. This approach is used to estimate impacts of oil and gas development on Garfield and Kane counties.*

Carbon counties was used as a proxy for the socioeconomic study area's coal mining industry because the industry does not yet exist within this area.

BLM management decisions under each alternative are not expected to alter potential coal production levels. Thus, the expected socioeconomic impacts associated with coal production are expected to be the same under each alternative as described below.

Table 4-31. Annual Coal Mining Value of Production from Federal Mineral Estate

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Federal Production (1,000 Short Tons)	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430
Average Minemouth Price (2006$s)	20.84	20.63	20.42	20.37	20.34	20.44	20.83	21.19	22.41	22.89
Value of Production (1,000$)	$29,807	$29,508	$29,195	$29,126	$29,086	$29,229	$29,792	$30,300	$32,044	$32,727
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Federal Production (1,000 Short Tons)	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430
Average Minemouth Price (2006$s)	23.89	24.08	24.72	25.71	26.39	27.65	28.31	28.88	29.37	29.61
Value of Production (1,000$)	$34,167	$34,430	$35,353	$36,771	$37,733	$39,537	$40,488	$41,291	$41,993	$42,349

Oil and Gas Drilling and Production Economic Impact Analysis Methodology

The economic impact of oil and gas operations was analyzed in two phases:

- Phase I: Exploration and Development
- Phase II: Production.

Phase I considered how many exploratory and development wells would be drilled in the decision area and how many would be completed as producing wells. The average number of wells expected to be drilled within the decision area was taken from the RFD. While the RFD figure encompasses the entire planning area, insufficient information exists to allocate the RFD wells to planning area lands versus other lands. It was assumed that all wells predicted in the RFD are on decision area land. This assumption is consistent with RMP/EIS oil and gas assumptions for other resources and resource uses. This is an appropriate approach when the level of activity in a sector is relatively small. This assumption results in an analysis that indicates the maximum potential economic contribution to the local economy of oil and

gas activity on decision area lands. This maximum contribution can then be compared to the contribution of other sectors in order to assist in understanding the relative impacts. A number of additional assumptions were necessary for this analysis; they are summarized in Table 4-32.

Table 4-32. Assumptions for Fluid Minerals Economic Impact Analysis (in 2005 Dollars)

Item	Assumption/Estimate	Source
Number of wells drilled per year	4.5	Appendix I RFD Table I-1 figures of 90 total wells divided by 20-year period
Number of wells entering production per year*	1	Appendix I RFD Table I-1 figures of 20 production wells divided by 20-year period
Type of wells Oil Conventional Gas	Not germane	A breakdown by type of well is not necessary because the costs of drilling and completion for both types are estimated to be the same.
Average cost of drilling and completion to producing well Oil Conventional Gas	$2.25 million $2.25 million	BLM State Office mineral staff, based on costs in recent "Paying Well Determination" submittals for wells similar to those expected in the Kanab Draft RMP/EIS decision area.
Average cost of drilling and completion to dry hole Oil Conventional Gas	$1.35 million $1.35 million	BLM State Office mineral staff professional judgment.
Average annual operating costs Oil Conventional Gas	$60,000 $60,000	BLM State Office mineral staff, based on costs in recent "Paying Well Determination" submittals for wells similar to those expected in the decision area.

* Development of the 20 expected production wells likely would occur in a single field, developed within a few-year span. However, there is no way of knowing when and where the oil and gas development will happen. For analysis purposes the development is spread out annually, at one well per year, to estimate economic impacts.

With regard to Phase I, the assumptions result in figures of $6.975 million for annual oil and gas well drilling and completion costs. Not all of these expenditures benefit the socioeconomic study area because the oil and gas industry within the socioeconomic study area is quite small due to the low level of development that has occurred in this area. It was therefore assumed for this analysis that all the drilling operators would originate from areas outside the study area. Investment in oil and gas drilling would have less of an economic impact on the area because most of the direct expenditures (labor costs in particular) would not be recirculated back into the local economy. However, some businesses that would support drilling activities indirectly are located in the study area; for example, water hauling is used by the drilling crews. A study of impacts of gas drilling in Carbon and Emery counties concluded that only 40 percent of the direct expenditures for new wells would occur locally (Utah Department of Natural Resources 1995). The same assumption was used for oil and gas exploration and development activities in the decision area. Therefore, 40 percent of the drilling and completion costs were run through IMPLAN Sector 28, Support for Oil and Gas Activities, to estimate employment and income impacts of this potential activity. An economic profile of this sector based on IMPLAN data for Emery and Carbon counties was used as a proxy for the socioeconomic study area's oil and gas support activities industry because the drilling industry has not been active in the area since before the data for the IMPLAN model was compiled.

The impacts associated with oil and gas production were estimated under Phase II. Here, the annual direct expenditures needed to operate each completed oil and gas well, as summarized in Table 4-32, were used

to estimate employment and income impacts. These expenditures were assumed to be 100 percent local. This assumption would overestimate the impacts associated with oil and gas production if some of these expenditures are actually made outside of the local planning area. The annual economic contribution of this activity was estimated by running the annual direct expenditures for well operations through IMPLAN Sector 19, Oil and Gas Extraction, for counties within the socioeconomic study area. The annual amount and impact of these expenditures would grow throughout the planning period as more and more successful wells come into production each year.

Insufficient information exists in the Draft RMP/EIS alternatives to quantitatively differentiate drilling and production levels by alternative.

Livestock Grazing Economic Impact Analysis Methodology

Historical data from Table 3-25 and varying management policies by alternative were used to estimate future livestock use under each alternative, as summarized in Table 4-33. The estimates summarized in this table represent two approaches to projecting the AUMs that would be used by permittees on an annual basis. Permitted use under all alternatives would be greater than 18,000 AUMs. However, in recent years the active use (paid for in each year) of grazing allocations has been considerably less than permitted use. In the 2000 to 2006 period, on average 7,731 AUMs were active of 18,241 permitted, or 42.4 percent. This active use of 42.4 percent is due to a severe drought during 1999–2004. This rate of active use is likely to be lower than future active use as the region comes out of the drought—and active use in 2005 and 2006 did show an upward trend. Evaluating average active use and total permitted use, which is the maximum use under current permitted AUMs, provides a range that brackets likely future use. Thus the estimated future active use under each alternative is assumed to be between the average active use (42.4%) and the total permitted use. Given that grazing of sheep and horses is currently minimal in the planning area and that use is not expected to change over the next 20 years, economic impacts from these activities were not quantified.

Table 4-33. Livestock Use per Alternative (AUMs)

	Alternative A	Alternative B	Alternative C	Alternative D
Total Permitted Use	18,241	18,193	18,153	18,201
Conversion Factor to Current Active Use	42.4%	42.4%	42.4%	42.4%
Current Active Use	7,731	7,710	7,693	7,714

Over the past 10 years, less than 2 percent of active AUMs have been used for sheep and horses (Table 3-25). For the purposes of this analysis, it is assumed that all AUMs would be used for cattle grazing, which produces higher value per AUM than sheep grazing.

The value of cattle grazing per AUM was estimated as summarized in Table 4-34. Data was obtained from the Utah Agricultural Statistical Service, as shown in columns 2 and 3, and includes the value of cattle sold in Utah from 2000 through 2004. Total cattle sales were divided by the number of cows that had calved, which provided a value per cow sold, as summarized in column 4. The value per cow was then divided by an AUM conversion factor, resulting in an estimated value per AUM in nominal dollars. An inflation factor was used to convert nominal dollars to real dollars (2006) as summarized in column 7.

Using this method, the average value of cattle AUMs in Utah from 2000 through 2004 was estimated to be $48.82.

Table 4-34. Estimated Value of Cattle AUMs

Year	Value of Production (1,000$s)[a]	Cows That Have Calved (1,000 Head)[a]	Value Per Cow	Conversion to AUMs (AUMs/Cow)[b]	Value of Production Per AUM Nominal $s	Value of Production Per AUM Real 2006$s
2000	$296,585	450	$659.08	16	$41.19	$47.27
2001	$314,868	450	$699.71	16	$43.73	$49.03
2002	$284,580	450	$632.40	16	$39.53	$43.48
2003	$323,040	430	$751.26	16	$46.95	$50.65
2004	$358,715	440	$815.26	16	$50.95	$53.68
5-year average						**$48.82**

Notes:
[a] Utah Agricultural Statistics
[b] (Workman 1986)

The total estimated range of values of livestock production for each alternative was then estimated by multiplying the average value per AUM by the estimated number of total permitted AUMS and current active AUMs to get the range of total current value of production from grazing allocations on BLM lands within the planning area. The results are summarized in Table 4-35.

Table 4-35. Estimated Range of Values of Livestock Production by Alternative per Year

	Alternative A	Alternative B	Alternative C	Alternative D
Value of Total Permitted Use	$890,504	$888,161	$886,208	$888,551
Value of Current Active Use	$377,397	$376,404	$375,577	$376,570

The economic contribution of this activity in terms of jobs and income was estimated by running the value of grazing activities—under current active use and total permitted use scenarios—through IMPLAN Sector 11, Cattle Ranching and Farming, for Garfield and Kane counties.

Other Sectors

Some sectors have sufficient data to allow quantification of basic costs and market values, but insufficient data to allow quantification of employment and income impacts. These sectors are:

- Vegetation – plants and seeds. Insufficient data (e.g., species and size) is available for plants, but costs and values of seeds can be calculated.
- Woodland products – fuelwood, posts, and Christmas trees.

For these sectors, basic data was collected on quantities harvested, costs charged by the BLM, and approximate values in the local market. This data allowed calculation of a) total costs paid to the BLM, b) total value in the local market, and c) total savings, defined as total market value minus total cost.

Employment and income impacts could not be calculated because IMPLAN does not have economic sectors that are specific enough to these products. However, given the relatively small values shown below, employment and income generated by these harvests are small compared to the other sectors discussed above.

There were sectors for which quantification of economic impacts might be expected but was not possible. For these sectors (Table 4-36), qualitative description of economic impacts is provided under each alternative if there are any economically discernable differences in the alternatives.

Table 4-36. Sectors for Which Quantification of Economic Impacts Is Not Possible

Use	Reason(s) Impacts Cannot Be Quantified
Locatable minerals; specifically, septarian concretions and gypsum	The RFD indicates limited development will occur. However, there is insufficient information on quantities expected to be mined.
Salable minerals; specifically, sand and gravel, stone, clay	The RFD indicates sand and gravel and stone development is expected, and limited clay development will occur. However, there is insufficient information on quantities expected to be mined.
All other minerals	According to the RFD, no exploration or development of other minerals is expected.
Lands and realty	There is insufficient information on actions that would occur or would be precluded to allow quantification of economic impacts. Parcel-specific information, including projected sales prices and rental rates, would be required.
Recreation; transportation (OHV use)	Recreation Management Information System (RMIS) data discussed in Section 3.3.3 is not considered accurate enough to allow for credible estimates of economic impacts. In other cases (e.g., OHV registrations), there is insufficient information to attribute use specifically to decision area lands, or (e.g., recreation permit data) insufficient information on expenditures of recreators for specific uses in the decision area or similar areas.

Fiscal impacts are a separate category of impacts from those addressed by the IMPLAN model. Fiscal impact analysis is highly data intensive and depends on very specific assumptions. Currently, there is insufficient data to accomplish quantitative fiscal impact analysis of the alternatives. However, some qualitative comments on fiscal impacts are possible and are included by alternative below.

Results: Impacts on Regional Employment and Income

The total economic impacts from coal mining, oil and gas drilling and production, and livestock grazing from activities directly attributable to decision area lands were estimated using IMPLAN and the total value of expenditures or production developed from the data and assumptions discussed above. Table 4-37 provides the results for employment (full- and part-time jobs) and labor income on an annual basis.

The coal mining, oil and gas production, and livestock production figures are given as ranges. For coal, this is because the forecasted selling price rises each year. For oil and gas production, operating expenditures will increase as more wells come online over the 20-year RFD planning period. For livestock production, the range indicates the economic impacts under recent rates of active AUM use and the impacts should full permitted AUM use occur. In the case of oil and gas exploration and development, due to the conservative assumptions of the analysis, the figures in Table 4-37 are the maximum potential economic benefits; the benefits specifically attributable to decision area lands could be less.

For all resource uses in Table 4-37 except livestock grazing, the IMPLAN analysis was based on Alternative A because insufficient information is available to allow quantification of economic differences between the alternatives. In the case of livestock grazing, the alternatives include differences in the number of AUMs allocated to livestock. However, the resulting differences in the value of production, when run through the IMPLAN model, produced differences for employment of well less than one job and differences in labor income of only a few hundred dollars for current active AUMs and total permitted AUMs—in both cases well within the margin of error of any economic model and within the rounding margin for reporting of results. Therefore, the quantifiable economic impacts of the grazing alternatives are deemed identical.

The lack of quantifiable differences in economic impacts in Table 4-37 does not mean that differences would not occur. Some differences are simply not quantifiable given the available data. The most important potential variations in economic activity between the alternatives are noted in the narratives below for each alternative.

It is very important to note that BLM public lands generate additional jobs and income that is not shown in Table 4-37. The economic contributions of a number of uses of BLM lands could not be quantified. In particular, recreational activities (including OHV-based recreation) no doubt generate substantial employment and income. The other activities discussed in Table 4-36 make smaller, but important, economic contributions.

Employment and income generated by activities associated with the BLM lands in this RMP/EIS are a small percentage of total employment and personal income in the two-county socioeconomic study area. IMPLAN reports that total employment in the study area exceeded 7,300 while income topped $239 million in 2003.

Table 4-37. Annual Employment and Income (in 2006 Dollars) Generated in the Socioeconomic Study Area from Use of BLM Lands Under RMP/EIS Alternatives

Sector	Average Annual Employment		Average Annual Labor Income	
	Direct	Indirect/ Induced	Direct	Indirect/ Induced
Coal Mining*	125 to 178	42 to 59	$9,483,000 to $13,473,000	$1,389,000 to $1,973,000
Oil and Gas Drilling*	9	3	$774,000	$85,000
Oil and Gas Production*	<1 to 6	<1 to 1	$9,000 to $173,000	$2,000 to $38,000
Livestock Production**	8 to 18	3 to 8	$19,000 to $44,000	$37,000 to $88,000

Notes:
*Estimates are based on Alternative A. Insufficient information is available to quantify differences between Alternative A and the other alternatives. Ranges in the values for coal mining reflect increases in the value (price) of coal over the study period, and the ranges for oil and gas production reflect more production wells coming online during the study period.
**Differences in AUMs and resulting value of production by alternative were calculated; however, the resulting differences in employment and income were not significant and were within the rounding margin. The range in employment and income reflects current active use (low value) and full permitted use (high value).

Source: IMPLAN model, based on data and assumptions for production from BLM lands as detailed in the text.

Results: Basic Cost and Value Analysis

Table 3-7 provides quantities of seeds collected from decision area lands. Table 3-23 provides quantities of fuelwood, posts, and Christmas trees collected. This data allows a basic analysis of costs and values, as shown in Table 4-38.

Table 4-38. Costs and Values of Harvests from BLM Public Lands

Product	Average Harvest, 2001–2006[a]	BLM Charge per Unit[b]	Market Value per Unit[c]	Total Cost to Harvester/ Revenue to BLM	Total Market Value	Total Savings to Harvester	Total Savings at Highest Harvest[d]
Sagebrush seeds (pounds)	200	$0.34	$4.00	$67	$800	$733	$733
Four-wing Saltbush seeds (pounds)	300	$0.15	$4.00	$45	$1,200	$1,155	$1,155
Winterfat seeds (pounds)	10	$0.30	$8.00	$3	$80	$77	$77
Fuelwood (cords)	501	$5.00	$100.00	$2,504	$50,083	$47,579	$56,810
Posts (number)	3,527	$0.40	$5.00	$1,411	$17,636	$16,225	$22,563
Christmas trees (number)	119	$5.00	$40.00	$597	$4,773	$4,177	$5,215

[a] Seed figures were available only for 2006.
[b] Seed charges are from BLM Utah State Office Instruction Memorandum No. UT 2003-080, Seed Collection Policy and Pricing, July 31, 2003. Other charges are from Kanab Field Office personnel.
[c] Market values for seeds are typical "dirt weight" prices paid to harvesters (not retail prices) from Granite Seed Company, Lehi, Utah, per April 2007 interview. Other values are from Kanab Field Office personnel.
[d] Values in this column are based on the highest harvest level in the available data.

The figures in Table 4-38 for the total savings to the harvester represent different types of value, depending on the product and the harvester. In the case of seeds, which are largely harvested for resale to retail seed companies, the total savings represents the revenue from which a commercial seed harvester can pay wages and other costs and take profits. For fuelwood, posts, and Christmas trees, the total savings represent either the same type of revenue pool, such as for commercial operators who re-sell the products, or, for individuals and families who harvest these products for their own use, represent money they save by harvesting from BLM public lands. These savings allow them to spend this portion of their income on other needs.

Social Impact Analysis Approach

Along with fish, wildlife, vegetation, and the physical environment, people are an integral part of ecosystems. Livelihoods, lifestyles, attitudes, beliefs, values, social structure, culture, and population characteristics affect and are affected by management actions such as those made by the BLM. In addition, BLM lands and BLM management of these lands have emotional meanings to many people.

As discussed in Section 3.5.1, there are a number of broad but distinct types of use of and interests in BLM land. These categories reflect the different linkages people have to the land. They are characterized by distinct sets of values, opinions, and perceptions about BLM lands and the effects of various land management policies and actions. The interest categories, as defined in Section 3.5.1, are:

- Local traditional use
- Motorized recreation
- Non-motorized recreation
- Outfitter-based recreation
- Livestock grazing
- Natural resource development
- Preservation.

The social impact analysis in this Draft RMP/EIS uses these categories of interest to differentiate impacts of management actions under each alternative. The analysis is written in terms of impacts on individuals or groups who have interests in each specific category. This is not meant to imply that all individuals and social groups fit neatly into a single category; many specific individuals or organizations may have multiple interests and would see themselves reflected in more than one category. Nonetheless, these categories provide a useful way of organizing the discussion of social impacts. The social impact analysis is qualitative and based on knowledge of resource uses and social patterns and conditions in the socioeconomic study area.

Impacts Common to All Alternatives

Economic Impacts

Certain activities within the planning area are now occurring, or expected to commence, and are expected to continue in the future. The activities that are expected to have the greatest impacts on the regional economy include coal production, oil and gas exploration and production, livestock grazing, and recreation and tourism. There are minor differences in the alternatives with respect to the economic impacts of management decisions, which are discussed under the alternatives. The economic impacts that are expected to be common to all alternatives are as follows:

- Direct economic benefits to the socioeconomic study area would accrue from BLM-influenced activities, such as coal production, oil and gas development, livestock grazing, and recreation and tourism.
- Various industries in the regional economy would continue to be indirectly affected by activities within the planning area, including retail establishments and services that benefit from expenditures of labor income generated by resources uses on BLM public lands.
- Tax and other revenues derived from activities on BLM-administered lands would continue to have fiscal implications for the Federal Government, the State of Utah, and communities near the planning area.
- BLM KFO budgets will provide inputs to the local economy. Payroll for field office employees and material purchases and contracts for restoration and rehabilitation of public lands (e.g., vegetation treatments to achieve vegetation and range management goals and Desired Wildland Fire Conditions) represent inflows of money to the socioeconomic study area. The resulting economic benefits cannot be quantified, or differences in benefits between the alternatives characterized, due to insufficient information on likely levels of specific types of expenditures.
- Economic benefits from development of locatable minerals are expected to be low. Excepting septarian nodules and alabaster, there is low potential for locatable minerals in the decision area, and management actions in all alternatives are not expected to affect development.

- Economic benefits from sand and gravel and stone development are expected to increase over the planning period. Exclusions from mineral material disposal under the alternatives will have little impact on these economic contributions because ample sites for development are available under all alternatives. Economic benefits will include jobs and income from production and sale of mineral materials, and cost savings to local governments and other entities resulting from avoidance of transport or purchase of mineral materials from more distant locations.
- Commercial timber harvesting has not occurred in recent years on decision area lands and is not expected to occur under any of the alternatives.
- Population growth would continue regardless of BLM management actions, and this growth, not activities on BLM lands, would drive most of the economic changes expected to occur in the socioeconomic study area over the planning period.
- Designations of ACECs, wilderness areas, WSRs, and other designations would produce "designation effects" that draw non-local visitors to the socioeconomic study area, resulting in monetary inflows to the area through expenditures in local establishments. The economic impacts due to these effects are encompassed within the discussions below related to specific resource uses.

Impacts on Population

Any population change that could be associated with implementation of alternatives under consideration in the Draft RMP/EIS likely would be linked to employment changes. The most notable employment change expected under the Draft RMP/EIS would derive from the initiation of coal mining in the decision area. Coal development could produce approximately 237 new jobs in the planning area by the end of the planning period. This is a large amount of jobs compared to the population base of the area near the proposed mine. It is unlikely these jobs would all be absorbed by the existing population of the nearest communities—Census 2000 total populations were 134 in Alton, 355 in Glendale, 596 in Orderville, and 127 in Hatch—or by the population growth through the planning period that would be expected in these communities without the mine. Some of the jobs might be also be absorbed by the existing and growing—but more distant—populations of Kanab and Panguitch (3,596 and 1,623 in 2000, respectively). Nonetheless, it appears likely that the proposed mine would result in some population growth above and beyond the growth expected in the socioeconomic study area without the mine, particularly in the communities closest to the proposed mine. Detailed characterization of possible population changes is beyond the scope of the Draft RMP/EIS, but would be addressed in an EIS that would be required for the proposed coal mine.

Other employment changes due to Draft RMP/EIS decisions would not result in notable population changes. New oil and gas development and production expected under all alternatives would produce at most 19 jobs. Some differences between the alternatives in management actions with respect to recreation, transportation (OHV use), and grazing could result in variations in employment. These variations cannot be quantified given available information. However, these variations would be small in relation to the overall employment supported by these resource uses under all alternatives because substantial recreation, OHV, and grazing activity would occur under all alternatives. The variations would be negligible in relation to total employment in the socioeconomic study area. It is possible that variations in land disposals between the alternatives could produce locally significant differences in use of some current BLM lands for economic development. However, this possibility cannot be confirmed or denied given information available at the RMP decision level, and in any case it is likely that these variations would only affect where already-expected socioeconomic study area economic and population growth is absorbed, rather than leading to new population growth.

Impacts on Community Services

Draft RMP/EIS decisions could cause impacts on local government services in various ways. For example, changes in demand for local government services could vary with changes in population tied to management actions. As discussed above, with the exception of coal development, notable population changes are not expected under any alternative. The level of coal development and production expected under all alternatives would lead to an increase in employment that would probably result in population increases. These increases could be locally significant, resulting in new demands on community services. For example, demands on schools and utilities in the communities closest to the proposed coal mine could increase. It is not clear whether existing infrastructure in these communities could absorb these increased demands.

Management actions could also affect local government services directly. For example, the proposed coal mine would increase road maintenance and traffic control requirements on nearby roads and highways due to increased employee and heavy truck traffic. Detailed characterization of possible direct and indirect community services impacts is beyond the scope of the Draft RMP/EIS, but would be addressed in an EIS that would be required for the proposed coal mine. Specific actions to mitigate community service impacts of the coal mine would be determined in the coal mine EIS.

Other activities supported by Draft RMP/EIS management decisions have implications for community services. For example, increased recreational use of decision area lands (including OHV use), which is likely to occur under all alternatives due to regional and national trends, would increase the demand for local government services associated with safety, emergency services, and police protection. While local search and rescue operations use volunteers, there would be a growing need for training, equipment, and resources. In addition, these operations must be supported by the Sheriff's Office in each county. Road maintenance and traffic control requirements might also increase with the increased recreational demand expected under all alternatives. However, it is unlikely that recreational use would vary between the alternatives in ways that would result in substantial variations in public safety, road maintenance, traffic control, or other community infrastructure and service needs. The types of community service impacts noted here could be mitigated through cooperation between the BLM, other local federal and state agencies, and local governments to establish efficient means for providing the necessary services.

Increased government services also may be needed to support oil and gas development and production. This could include emergency and safety services and road maintenance. However, oil and gas development in all alternatives is very limited compared to major oil and gas producing areas in other parts of the western United States. Any community service impacts would be limited, and could be mitigated through cooperation between the BLM and local governments to efficiently provide necessary services.

Impacts on Public Finance

Management decisions under the Draft RMP/EIS alternatives could affect various revenues collected by the federal, state, and various local governments. The Socioeconomic Baseline Report (BLM 2005b) details a variety of revenue sources that are tied to or related to natural resource management on BLM lands.

The largest revenue changes expected under the RMP would stem from new coal mining activity expected under all alternatives. The Federal Government would collect substantial new mineral rents, royalties, and possibly bonuses from the coal mine operator. Fifty percent of these revenues would be retained by the Federal Government, and 50 percent forwarded to the State of Utah. The State would provide some of these revenues to local governments through a variety of funds, only one of which is

directly proportional to the mineral revenues produced by each county. The State would probably obtain some new income tax revenue from the coal mine operator. The State has no severance tax on coal. Local governments likely would obtain some new natural resource property tax revenues from the coal mine. These revenue impacts would not vary between the alternatives because coal production is not expected to vary by alternative. They cannot be quantified in the Draft RMP/EIS given currently available information, and it cannot currently be determined if new state and local government revenues would offset the financial requirements of any increased demands on community services. Such fiscal impacts should be examined in an EIS that would be required for the proposed coal mine.

Oil and gas production expected under all alternatives would produce some new federal and state mineral revenues, and the State would in turn provide some oil and gas revenues to the counties of origin. The State also would obtain new revenues from its oil and gas severance tax, oil and gas conservation fee, and income taxes. Local governments would obtain new revenues from associated natural resource property taxes. Because the amount of oil production is unknown these impacts cannot be quantified, but they are not expected to vary between the alternatives because the RFD scenario does not vary between the alternatives.

Under all alternatives, the BLM would collect revenues through ROW rents, recreation fees, grazing fees, mineral material fees, and other permit fees. Some of these fees would be forwarded to the federal treasury; others would be returned to state and local governments and local grazing boards or retained and used by the KFO.

All alternatives are expected to continue to generate local sales and lodging tax revenues through expenditures of visitors in local establishments. These revenues would increase through the planning period as visitation increases due to regional and national trends and management actions that increase the attractiveness of the decision area to non-local visitors.

Land tenure adjustments under the BLM lands and realty program could potentially impact local government finances. Disposal of BLM lands to private ownership may reduce Payments In Lieu of Taxes (PILT) by the Federal Government to local government, but also would result in payments of property taxes to local government by the new private property owners. Land exchanges to other governments may also impact PILT payments. Acquisition of private land by the BLM would reduce property taxes paid to local government but would increase PILT payments. Differences between the alternatives and the net impact on local government finances cannot be determined without detailed information on the specific properties in question and the tax rates and other financial figures for the particular local governments.

Social Impacts

A number of social impacts would be common to all alternatives:

- Activities and resources available in and around the planning area would continue to be important to the quality of life of current and future residents and visitors.
- Management of BLM lands within the decision area has and will continue to have important social implications for many individuals and groups. This includes local residents that depend on development activities on BLM lands as a source of employment, income, or subsistence. Others are tied to the public lands for natural beauty, open space, recreational activities, and general ecosystem health.
- Livestock grazing tied to the planning area would continue to have social and cultural importance in the study area. Challenges to continuation of these traditions would continue regardless of

BLM management decisions, due to broader trends in the economics of grazing, inter-generational transfer of grazing operations, and other considerations.

- Conflicts between resource users would continue under all alternatives. Some variations between the alternatives in this regard are discussed below.
- None of the alternatives would significantly impact local residents' "Sunday drive" enjoyment of BLM lands or other casual, dispersed uses not involving OHVs or harvesting of products off of BLM land (these aspects are discussed for each alternative).
- Because of the population increases resulting from a new coal mining operation, all alternatives are likely to result in social changes as people move to the socioeconomic study area to take some of the coal mine and supporting jobs. Some of these new residents likely would have values and preferences that differ from existing residents. The number of new jobs and new residents due to the coal mine is fairly small compared to overall socioeconomic study area figures, but could be locally significant.
- WSAs would continue to be managed for potential designation under all alternatives, thus maintaining values in these areas related to resource preservation and possibly foregoing values related to resource development, until specific wilderness status decisions are made by Congress.

Environmental Justice

No environmental justice populations exist in the socioeconomic study area, based on federal criteria and the analysis in the Socioeconomic Baseline Report (BLM 2005b). The management actions under all alternatives therefore have no environmental justice implications.

Alternative A

Economic Impacts

Vegetation – Plant and Seed Collection

Continuation of plant and seed collection is permitted and likely under all alternatives. Table 4-38 shows the value of these practices to the BLM, in terms of the revenues received from fees charged to collectors, and to the collectors, in terms of the value they receive from seed companies who purchase the seeds. As shown in the table, these values are relatively small, totaling $115.00 in revenue to the BLM in 2006 and $2,080 in market value or $1,965 in net value to the collectors.

Coal Production

Coal production on BLM-administered lands is considered likely under all alternatives. Coal mining would directly support 125 jobs, increasing to 178 jobs in the local economy by the end of the planning period. Spending of income from these jobs is expected to generate additional economic activity in the local economy that would support, on average, 42 indirect and induced jobs, increasing to 59 indirect and induced jobs. Therefore, coal production on BLM-administered lands is expected to support up to 237 total jobs. Coal production is also expected to generate more than $15.446 million in total annual earnings by the end of the planning period. Because changes in management described under each alternative are not expected to impact coal production (but may impact operational costs), the economic contributions estimated for coal are not expected to differ under any of the alternatives.

Oil and Gas Drilling and Production

Historically, the planning area has seen limited oil and gas exploration and very little development. Interest has recently increased with increased oil and gas prices. The RFD predicts 90 wells will be drilled in the planning area over the 20-year planning period. This is an average rate of about 4.5 wells per year. Using the data and assumptions outlined above, annual expenditures for oil and gas drilling attributable to

decision area lands are expected to support at most nine direct jobs, three indirect and induced jobs, and $859,000 in labor income in the two-county socioeconomic study area. Additional, unquantifiable but very small numbers of jobs and income would be supported by geophysical survey activity. Expenditures on oil and gas production would support less than one job and $11,000 in labor income in the first year of the planning period, increasing to seven jobs and $211,000 in labor income in the last year. Because changes in management described under each alternative are not expected to substantially impact oil and gas drilling and production (but may impact development costs), the economic contributions estimated for oil and gas are not expected to differ under any of the alternatives.

Livestock Grazing

Grazing use of BLM lands would continue to provide jobs and income in the socioeconomic study area under Alternative A. Levels of grazing likely would be between current active use (which reflects recent drought conditions) and total permitted use. Based on the annual value of production from current active use of BLM grazing AUMs and the IMPLAN model, employment directly supported by livestock grazing on BLM lands for current active use is estimated to be eight full- or part-time jobs, with another three jobs from indirect and induced effects in the local economy. Employment directly supported by livestock grazing on BLM lands for total permitted use is estimated to be 18 full- or part-time jobs, with another eight jobs from indirect and induced effects in the local economy. Livestock production attributable to BLM land from current active use would result in $19,000 in direct labor income per year and another $37,000 in indirect and induced income, while livestock production attributable to BLM land from total permitted use would result in $44,000 in direct labor income per year and another $88,000 in indirect and induced income. Range treatments under Alternative A could potentially increase the amount of forage available for livestock, possibly leading to an increase in active use of AUM grazing allocations and greater economic contributions from grazing. However, the amount of any increase cannot be quantified.

Recreation

Recreational activities on decision area lands are expected to continue to have economic value for local residents and to affect regional economic activity by drawing visitors to the area for its unique recreational opportunities. Recreators are drawn to BLM lands both as destinations in themselves and for access to additional public lands in the region. BLM estimates of recreational use indicate that there currently might be more than 200,000 recreational visitor-days spent in the decision area each year. The proportion of non-local use is not known but is surely substantial. As visitors come to this area to recreate, they spend money on goods and services, such as lodging, meals, gasoline, guides, and other items that support their activities. These expenditures provide monetary inflows to the socioeconomic study area, creating an important economic stimulus.

Accurate quantification of this economic stimulus is not possible at this time because of the lack of verifiable data on recreational use specifically attributable to BLM lands. Nonetheless, recreation is one of the key uses of decision area lands, and it is clear that the level of use of BLM lands indicates that recreation is an important contributor to the local economy. Recreation expenditures support the services sector, which is the second largest sector of the local economy for wages and salaries in both Garfield and Kane counties (see Section 3.5.1, Tables 3-3 and 3-4). This is also a sector that has been showing strong growth.

Indirect data presented in Section 3.3.3 and the Socioeconomic Baseline Report (BLM 2005b) shows that recreation as an industry in the two-county study area has declined somewhat in recent years. However, the Utah Division of Parks and Recreation (2003) expects recreation and tourism figures to increase over the long term. Outside factors such as increasing populations along the Wasatch front are highly likely to result in increased visitation to southern Utah.

Within the BLM decision area specifically, indications are that recreation activity is now on the upswing. Visitation as estimated for the Recreation Management Information System (see Section 3.3.3) show Fiscal Year 2006 as the highest year for number of visitors within the last 6 years and the second highest for visitor-days. According to KFO data, receipts from SRPs, which are tied to gross receipts of the permittees, grew from $2,210 in 2005 to $4,063 in 2006. It is believed that increased commercial canyoneering activity and OHV riding represent important components of this increase.

Under Alternative A, demand for recreational activities on decision area lands is expected to continue growing during the study period. An increase in demand for recreational activities would have positive economic impacts on the local economy, generating jobs and income as visitors spend money while visiting the area.

Transportation

OHV use is expected to increase in the decision area through the life of the RMP. The rapid recent increase in OHV registrations in the socioeconomic study area and in the State (see Section 3.3.4) is indicative of the trend in OHV use. As with recreation, OHV use provides economic value to local residents and bolsters the local economy by drawing visitors from outside the area. Trails within and across the decision area are an important part of this drawing power. The expenditures of these visitors in local establishments and for local services provide an economic stimulus to the local area. It is not possible to quantify the local jobs and income that result from these expenditures due to the lack of reliable data on OHV use specific to decision area lands. However, it is clear that use of BLM lands for OHV-based recreation provides important benefits to the local economy. Under Alternative A the economic stimulus provided by OHV-focused visitation would be an important economic benefit and one that would increase over time.

Forestry and Woodland Products

Domestic and limited commercial harvesting of woodland products (e.g., cedar posts, Christmas trees, and fuelwood) is expected to continue under Alternative A, and biomass utilization could occur. These harvests provide small amounts of income to some local residents and help reduce household expenses for others. As shown in Table 4-38 above, on average the savings to households, compared to purchases at market rates, amount to $47,500 for fuelwood, $16,200 for cedar posts, and $4,200 for Christmas trees.

Lands and Realty Program

Under Alternative A, requests for ROWs, permits, leases, withdrawals, and land tenure adjustments from other RMP programs or outside entities are expected to increase as neighboring communities grow and the demand for use of public lands increases. The amount of land expected to be available for FLPMA Section 203 sales (disposal) is not indicated for Alternative A. Disposal of BLM lands to local governments or private parties may further economic development within the socioeconomic study area or serve other important social purposes such as provision of special recreational areas. Neither the increased economic activity nor other social benefits or costs can be quantified within the framework of the Draft RMP/EIS process because these impacts depend on the location and timing of the specific land tenure adjustments. Analysis of these impacts would properly occur at the implementation level.

Similarly, ROWs, leases, and permits play important roles in the economy within and in some cases beyond the socioeconomic study area. Policies established in the Draft RMP/EIS may support or deny certain ROWs, leases, and permits, but actual impacts would depend on the specific location and proposal. The socioeconomic impacts cannot be quantified at the RMP level.

Social Impacts

Alternative A is expected to result in social impacts as described for the following interests:

- *Local traditional use.* Under Alternative A, residents who value harvesting of woodland products such as fuelwood, poles, and Christmas trees would be able to continue these harvests much as they do now, in most cases including where, when, and how they do so. For instance, utilization of OHVs for cross-country travel to facilitate these harvests, and for recreational purposes, could continue.
- *Motorized recreation.* People who enjoy current types of OHV access, particularly cross-country travel through most of the decision area, would continue to have access much as at present. Conflicts between individuals and groups who enjoy OHV use and others who object to certain OHV uses, while not necessarily becoming widespread (the conflict is perhaps more philosophical than actual specific impacts), would increase as the demands of both groups on decision area lands increase. Because Alternative A lacks an emphasis on designated routes, identified staging areas, and associated facilities, it would not provide optimal OHV experiences for many OHV users who desire these sorts of improvements.
- *Non-motorized recreation.* Some individuals and groups with this interest would experience declining recreational quality due to conflicts with cross-country OHV use. Also, recreational experiences for some users would be not be optimized because Alternative A would not provide the facilities and improvements that are contemplated under the other alternatives for various recreation management zones and associated market strategies.
- *Outfitter-based recreation.* This type of recreational opportunity could continue much as it currently does. However, under Alternative A the lack of clear guidelines and rules for SRPs required for this type of recreation might fail to adequately allocate and optimize this type of recreational experience.
- *Livestock grazing.* Under Alternative A, local ranchers would be able to continue grazing practices much as they do now. Current trends in customs and culture related to utilization of BLM public lands for the grazing of livestock would continue—including a variety of challenges to maintenance of the ranching economy and culture that would occur under all alternatives. Ranchers would have considerable ability under Alternative A to manage their public land operations to address these challenges, but also might forego benefits of range improvements and other rangeland health decisions contemplated under other alternatives.
- *Natural resource development.* Persons, companies, and social groups interested in mineral and energy development would enjoy much the same access to BLM lands for these activities as at present.
- *Preservation.* Under Alternative A, 15 river segments would continue to be managed as eligible for WSR status, maintaining preservation values. However, individuals and groups with this interest likely would experience a decline in preservation values over time, for a variety of reasons. These would include continued allowance of cross-country OHV use across most of the decision area, mineral and energy development policies that are less protective than under other alternatives, grazing management policies that do not emphasize wildlife and watershed values as much as this group might desire, ad hoc decisions on granting of ROWs, and the lack of use of designation of ACECs as a tool for protection of habitat, ecosystem, and related values.

Alternative B

Economic Impacts

Vegetation – Plant and Seed Collection

Impacts from plant and seed collection would be the same as Alternative A.

Coal Production

Impacts from coal production would be the same as Alternative A.

Oil and Gas Drilling and Production

Impacts from oil and gas drilling and production would be the same as Alternative A. Although the total number of acres closed to fluid mineral leasing (86,620 acres) or open to leasing with major constraints such as NSO (40,900 acres) is greater than Alternative A, this likely would not have substantial effects on oil and gas development and production activity and resulting jobs and income because substantial high-potential areas would remain open with standard stipulations or moderate constraints such as seasonal limitations. Thus, the level of oil and gas development estimated in the RFD scenario would be achieved. Increased areas open to oil and gas leasing subject to moderate and major constraints under Alternative B could increase the costs of oil and gas development somewhat.

Livestock Grazing

The quantifiable economic impacts from livestock grazing would be the same as Alternative A. Under Alternative B, livestock grazing could be discontinued after voluntary relinquishment of all or part of a grazing preference. This could result in some foregone opportunities, compared to Alternative A, for other ranchers and a small decrease in jobs and income due to discontinuation of grazing on the specific relinquished preference. However, the economics of grazing may be improved and sustained compared to Alternative A, because grazing systems and range improvements would be designed to achieve and maintain healthy rangelands. As with Alternative A, land treatments could lead to increased active use and increased livestock production, but the amount of any increase cannot be determined.

Recreation

Identification and management of SRMAs under Alternative B would result in reduced conflicts between uses and improved recreational experiences. These results could lead to increased draw for recreationists from outside the two-county socioeconomic study area, resulting in monetary inflows and increased economic activity compared to Alternative A. A variety of general recreation management actions, including improved interpretation, environmental education, heritage tourism activities, and recreation management actions attendant on SRPs, likely would contribute to increased attractiveness of the decision area to non-residents for commercial and private recreational uses, also leading to increased economic activity compared to Alternative A.

Transportation

Changes in OHV management actions under Alternative B could affect the beneficial economic impacts from OHV use, in particular the draw for OHV users from outside the socioeconomic study area, which would affect monetary inflows. Compared to Alternative A, very little of the decision area would remain open to cross-country OHV use. However, 524,000 acres would be available for use on designated routes, and only 7,700 more acres would be closed to OHV use. Eight percent of the OHV route mileage in Alternative A would be closed under Alternative B. It is unlikely that increased management of OHV access under this scenario would lead to decreased draw of OHV riders from beyond the socioeconomic study area. It is more likely that an increased emphasis on designated routes, coupled with other trends in OHV use regionally, would lead to increased visibility to and visitation by non-local OHV riders, resulting in increased monetary inflows and benefits to the local economy. The supporting trends include increasing participation by local and non-local (e.g., from the Wasatch Front) OHV groups in signage and maintenance of routes in the region. Improvement of routes within and outside the decision area would contribute to the overall attractiveness of the socioeconomic study area for OHV use by non-local OHV riders. However, closing 17 miles of routes within the WSAs would reduce the opportunities for income

associated with motorized-dependent SRPs and general OHV recreationists accessing these remote and scenic areas.

Forestry and Woodland Products

Impacts from forestry and woodland products would be the same as Alternative A. Compared to Alternative A, consolidation and simplification of permitting practices for woodland products under Alternative B would not dramatically open up new areas for woodland product harvests or alter demand, and therefore would have little or no effect on the economic value of such harvests compared to Alternative A.

Lands and Realty Program

Impacts from the lands and realty program would be the same as Alternative A. However, Alternative B specifies a specific acreage (6,460 acres) of public land that would be available for FLPMA Section 203 sales with NEPA compliance and consistent with other decisions in this RMP. Exclusions and constraints on ROWs under Alternative B are not expected to substantially constrain local economic development compared to Alternative A. Withdrawal of certain areas from mineral entry under Alternative B is not expected to reduce the economic contributions of mineral and energy utilization due to the limited extent of withdrawals relative to the total lands available for mineral entry.

Social Impacts

Alternative B is expected to result in social impacts as described for the following interests:

- *Local traditional use.* Under Alternative B, utilization of woodland products could continue much as at present; Alternative B decisions do not substantially change the availability of BLM land for these harvests. However, some local residents would have their access to woodland products complicated by closure of most of the decision area to cross-country OHV use. Closing 17 miles of inventoried ways in WSAs could result in a loss of opportunity to access areas traditionally used for uses such as family gatherings, hunting, and dispersed recreation.
- *Motorized recreation.* Individuals and groups with a strong preference for cross-country OHV use would lose many opportunities for this type of use under Alternative B. However, because 92 percent of existing OHV routes would remain available, most OHV users would be able to find satisfactory experiences. In addition, Alternative B includes provision of increased facilities and other improvements that likely would improve the recreational experience for many OHV riders. Also, emphasis on designated routes likely would reduce some conflicts with non-motorized recreationists because both groups' expectations of where OHV use would and would not occur would be clarified. However, closing 17 miles of inventoried ways in WSAs would result in a loss of opportunity to access remote, scenic areas by OHV.
- *Non-motorized recreation.* Recreational experiences of persons interested in non-motorized recreation would improve compared to Alternative A for several reasons. Areas and trails for motorized and non-motorized uses would be clarified. Identification and management of a number of SRMAs would clarify uses, provide facilities, and result in other improvements that enhance recreational experiences. A variety of general recreation management policies and practices, and increased interpretive and environmental education activities, also would enhance recreational experiences for motorized and non-motorized recreationists. In addition, closing 17 miles of inventoried ways in WSAs would eliminate interactions with OHV users and increase opportunities for solitude and naturalness on and adjacent to these ways.
- *Outfitter-based recreation.* Alternative B likely would have little social impact on persons interested in this type of recreational experience throughout most of the decision area. However, closing 17 miles of inventoried ways in WSAs would reduce the opportunity for OHV tours into

remote, scenic areas. A number of decisions related to SRPs would place some limitations on permitting and practices of outfitters, but many of these same decisions, such as limitations on group size, may also enhance the recreation experiences of persons who use outfitters.

- *Livestock grazing.* Impacts on livestock grazing custom and culture, compared to Alternative A, would be limited. There is little difference in the initial allocation of AUMs, and Alternative B would include land treatments that could increase availability of forage for livestock. Potentially there could be some social impacts resulting from the Alternative B decision that AUMs that are voluntarily relinquished by a grazing preference holder could be reallocated to other uses, such as wildlife forage. This could result in some foregone opportunities, compared to Alternative A, to maintain local grazing custom and culture by allowing other ranchers to obtain the allotments.
- *Natural resource development.* Persons and groups interested in natural resource development would experience few impacts from Alternative B compared to Alternative A. Commercial timber harvesting would still be permitted on a case-by-case basis. The total acreage closed to oil and gas leasing or open with major constraints such as NSO would increase somewhat, and the acreage open to leasing with moderate constraints such as seasonal limitations would increase substantially. Nonetheless, significant opportunities for oil and gas development would remain. These decisions could increase costs for operators, but would not result in less than full achievement of the RFD oil and gas development projections. Alternative B provides more defined policies for granting of ROWs for various economic activities, but would not substantially limit these uses of BLM lands.
- *Preservation.* Alternative B would satisfy many individuals and groups with preservation interests by substantially reducing cross-country OHV use. Increased constraints on or closures to oil and gas development compared to Alternative A also would increase protection of habitat, ecosystem, visual, and other values held by persons and groups interested in preservation. Some who have this interest may consider the decision to find only 6 of 15 river segments suitable for WSR status a loss of value compared to continued management in Alternative A of all segments as eligible. In addition, closing 17 miles of inventoried ways in WSAs would satisfy individuals and groups with preservation interests by increasing restrictions on uses that may result in impacts on WSAs.

Alternative C

Economic Impacts

Vegetation – Plant and Seed Collection

Impacts from plant and seed collection would be the same as Alternative A. The closure of WSAs and areas with wilderness characteristics to commercial collection under Alternative C likely would not affect the value of collections because most of the decision area would remain open to collection.

Coal Production

The type of impacts from coal production would be the same as Alternative A, except Alternative C could require greater mitigation effort for visual resource management and other values than Alternative A. Alternative C includes policies and decisions that are designed to protect, restore, and enhance natural values. This could increase costs for a coal mining operation; however, these costs likely would be small compared to the overall revenues produced from coal mining.

Oil and Gas Drilling and Production

Impacts from oil and gas drilling and production would be the same as Alternative A. Although the total number of acres closed to fluid mineral leasing (101,440 acres, including 89,870 acres in 10 areas with wilderness characteristics) or open to leasing with major constraints such as NSO (60,580 acres) is greater

than Alternatives A or B, this likely would not have substantial effects on oil and gas activity because substantial areas would remain open with standard stipulations or moderate constraints such as seasonal limitations. Thus, the level of oil and gas development estimated in the RFD scenario would be achieved. Development costs could increase somewhat due to the additional constraints.

Livestock Grazing

The quantifiable economic impacts would be the same as Alternative A. Impacts from the voluntary relinquishment of grazing preferences would be the same as Alternative B. Range treatments to increase livestock forage would not occur under Alternative C; therefore, potential but unquantifiable increases in active use and livestock production due to land treatments under Alternatives A and B would be foregone.

Recreation

Impacts from recreation would be the same as Alternative B.

Transportation

Impacts from transportation would be the same as Alternative B, with some potential for slightly reduced economic activity. Thirteen percent of the OHV routes available under Alternative B (19% compared to Alternative A) would be closed under Alternative C. A total of 28 miles in WSAs and 107 miles in areas with wilderness characteristics would be closed. Closure of through-routes represented in the 72 miles of route closures in the Upper Kanab Creek WC area and 11 miles of route closures in the Parunuweap WC area would impact additional OHV uses by altering access to and between other areas. Other WC area route closures would push OHV use back from certain canyon rims. Cross-country access to 1,100 acres of sand dunes available in the Moquith Mountain WSA under Alternative B would be prohibited under Alternative C. The various OHV closures could make the socioeconomic study area somewhat less attractive to OHV-based non-resident visitation, resulting in some reduction to monetary inflows to the area. An additional 144,500 acres would be closed to OHV use compared to Alternative A, but more than 388,300 acres would remain open to use on designated routes. Of this area, 84,500 acres would have seasonal closures in deer and elk crucial winter range from November 15 to April 15. Use of the decision area by non-local OHV riders at this time of year is probably low compared to the remainder of the year; thus, any reductions in economic activity due to reduced monetary inflows from non-local riders would be limited. Reductions in OHV opportunities under Alternative C could reduce the non-market economic values experienced by local residents from OHV use.

Forestry and Woodland Products

Impacts from forestry and woodland products would be the same as Alternative B. Commercial and non-commercial harvesting of woodland products would be somewhat more restricted under Alternative C—harvests would be permitted on a case-by-case basis instead of areawide, would be prohibited in riparian areas except in the case of riparian enhancement treatments, and would be prohibited in areas with wilderness characteristics except for incidental campfire and administrative use—but ample opportunities for these harvests relative to recent and expected demand would continue.

Lands and Realty Program

A smaller amount of land would be available for disposal under FLPMA Section 203 (2,540 acres versus 6,640 acres under Alternative B). New ROWs would be excluded from 89,870 acres of areas with wilderness characteristics. These actions could result in some opportunities for economic development being foregone. Increased withdrawal of certain areas from mineral entry under Alternative C is not expected to reduce the economic contributions of mineral and energy utilization because the total area available for these uses would remain substantial and adequate to meet the RFD's projected levels of mineral development.

Social Impacts

Alternative C is expected to result in social impacts as described for the following interests:

- *Local traditional use.* Alternative C could produce some impacts on social customs for woodland product harvests compared to Alternatives A and B: permitting of such harvests would be on a case-by-case basis, there would be tighter control of green tree cutting, riparian areas would be closed to such harvests with some exceptions, and areas with wilderness characteristics would be closed. While these decisions could constrain some residents' traditional uses, they would not prevent such uses from occurring. Alternative C duplicates the Alternative B prohibition on cross-country OHV use, which could impact some woodland product harvesting practices.
- *Motorized recreation.* Alternative C would have no areas open to cross-country OHV use, and would have other additional constraints on OHV use compared to Alternatives A and B (e.g., closure of all routes in areas with wilderness characteristics) that likely would be seen by persons and groups interested in this type of recreation as significant impacts on their recreational opportunities, preference, values, and enjoyment.
- *Non-motorized recreation.* Alternative C is the most favorable alternative to persons and groups who prefer non-motorized types of recreation. Its transportation (OHV management) decisions include closure of the entire decision area to cross-country use, closure of 287 miles of trails to OHV use (including all 107 miles in areas with wilderness characteristics) compared to 97 miles under Alternative B, and seasonal limitations on 281 miles of trail compared to 2 miles under Alternative B. These actions, particularly for WSAs and areas with wilderness characteristics, would increase opportunities for solitude and primitive, unconfined types of recreation. Alternative C would improve recreational experiences compared to Alternative A through use of SRMAs (somewhat fewer than under Alternative B) and a variety of general recreation management decisions.
- *Outfitter-based recreation.* Alternative C is the least favorable to outfitters and persons who prefer outfitter-facilitated recreational experiences. It has the tightest limitations on group size. It reduces OHV trail availability substantially and potentially affects outfitter access to certain areas. This includes seasonal closures of many trails; closures that may overlap with certain hunting seasons.
- *Livestock grazing.* Like Alternative B, Alternative C makes little change to status quo availability of livestock grazing AUMs. At the same time, like Alternative B, it would allow reallocation to non-livestock use of AUMS under voluntarily relinquished grazing preferences. Several other decisions may create some impacts on social preferences and customs and culture of livestock grazing compared to Alternative B. For example, where conflicts with other resource uses cannot be mitigated, suspension of livestock AUMs would be considered. Implementation of grazing systems and range improvements would emphasize enhancement of wildlife, watershed, and riparian values rather than livestock range values. No range treatments to increase forage for livestock would occur.
- *Natural resource development.* Alternative C is the least favorable to persons and groups interested in natural resource development because a number of its decisions would impact their preferences and values. Commercial timber harvests would be precluded. (However, few or no such proposals are expected.) Lands and realty program decisions under Alternative C are the most restrictive; these decisions include ROW exclusion areas, requirements to bury most powerlines, and the lowest amount of land identified for FLPMA Section 203 disposals. Alternative C also has the most area withdrawn from mineral entry and the greatest constraints on oil and gas development. These mineral and energy restrictions, however, would mostly increase costs to development by affecting locations and practices and are not expected to preclude currently anticipated levels of development.

- *Preservation.* Alternative C would result in the fewest impacts on and greatest protection of social preferences and values of persons interested in preservation. Alternative C has the most area withdrawn from mineral entry and the most protective constraints on oil and gas development. It prohibits all cross-country OHV use and includes substantial OHV trail seasonal limitations designed to protect critical habitat areas. Grazing systems and range improvements would emphasize enhancement of wildlife, watershed, and riparian values, and restrictions on woodland product harvesting have a similar intent. Lands and realty decisions such as ROW exclusion areas and requirements to bury most powerlines would protect environmental and scenic values. Alternative C also would designate the most ACECs (five), manage all 15 identified river segments as suitable for WSR status, and is the only alternative that provides specific protections to 89,870 acres of lands with wilderness characteristics.

Alternative D

Economic Impacts

Vegetation – Plant and Seed Collection

Impacts from plant and seed collection would be the same as Alternative A.

Coal Production

Impacts from coal production would be the same as Alternative A.

Oil and Gas Drilling and Production

Impacts from oil and gas drilling and production would be the same as Alternative A. Although the total number of acres closed to fluid mineral leasing (86,620 acres) or open to leasing with major constraints such as NSO (7,810 acres) is greater than Alternative A, but less than Alternatives B or C, this likely would not have substantial effects on oil and gas activity because all alternatives have substantial areas that would remain open with standard stipulations or moderate constraints such as seasonal limitations. Thus, the level of oil and gas development estimated in the RFD scenario would be achieved. Development costs could be less under Alternative D.

Livestock Grazing

The quantifiable economic impacts would be the same as Alternative A. Impacts from the voluntary relinquishment of grazing preferences would be the same as Alternative B. The economics of grazing may be improved compared to Alternative A, because grazing systems and range improvements would be designed to maximize livestock production while maintaining other resource values. As with Alternatives A and B, land treatments could lead to increased active use and increased livestock production, but the amount of any increase cannot be determined.

Recreation

Impacts from recreation would be the same as Alternative B.

Transportation

Impacts from transportation would be the same as Alternative B. A slightly higher amount of available OHV trails under Alternative D would be unlikely to have measurable economic effects.

Forestry and Woodland Products

Impacts from forestry and woodland products would be the same as Alternative B. The somewhat more relaxed permitting of woodland product harvests under Alternative D would have very little economic effect compared to the ample opportunities allowed under Alternative B.

Lands and Realty Program

A larger area of land would be available for disposal under FLPMA Section 203 (10,340 acres versus 6,640 acres under Alternative B). This could result in some increased opportunities for local economic development.

Social Impacts

Alternative D is expected to result in social impacts as described for the following interests:

- *Local traditional use.* Alternative D would allow most woodland harvest practices areawide and is the most favorable alternative to persons interested in these uses. Unlike Alternative A, however, Alternative D would not allow cross-country OHV use in most areas to facilitate such harvests.
- *Motorized recreation.* Alternative D is generally favorable to persons and groups interested in motorized access to BLM lands. While it would allow only limited cross-country OHV use, it would provide more managed open use areas and more miles of designated routes than Alternatives B and C, and otherwise would place on OHV use the minimum restrictions necessary to protect resources while providing for resource use needs. Like Alternatives B and C, Alternative D would emphasize designated OHV routes, which would clarify expectations for motorized and non-motorized recreationists alike, helping to avoid potential resource use conflicts.
- *Non-motorized recreation.* Alternative D would be less preferable to persons and groups interested in non-motorized recreation than Alternatives B and C, but would still provide substantial opportunities and improved recreational experiences compared to Alternative A. Alternative D designates somewhat fewer SRMAs than Alternatives B and C, but has similar general recreation management and interpretation and environmental education decisions, which would help enhance experiences for all recreational users.
- *Outfitter-based recreation.* The interests of outfitters and their clients would be served under Alternative D in a similar manner to Alternative A, with larger group sizes allowed. Use of OHVs to facilitate outfitter-base recreation would be similar, because the acreages in different OHV use classes and miles of available routes are similar.
- *Livestock grazing.* There is little difference between Alternative D and all others with respect to allocation of AUMs to livestock. Like Alternatives B and C, Alternative D would allow reallocation to non-livestock use of AUMs under voluntarily relinquished grazing preferences, which could result in foregone opportunities to maintain grazing custom and culture by reallocating AUMs to other ranchers. However, like Alternative B, Alternative D would include land treatments designed to increase forage availability for livestock. Alternative D is the most favorable with respect to grazing systems and range improvements that would support most ranchers' practices: these systems and improvements would be designed to maximize livestock production while maintaining other resource values.
- *Natural resource development.* Alternative D is the most favorable alternative to persons and groups who support development of natural resources on BLM lands. It permits commercial timber harvests areawide (however, few or no such proposals are expected). It also includes the highest amount of land identified for FLPMA Section 203 disposals and has the fewest restrictions on new ROWs. Alternative D has the fewest withdrawals from mineral entry. It has

more acreage closed to oil and gas development than Alternative A, but the least amount of acreage with constraints on oil and gas development.

- *Preservation.* Persons and groups interested in preservation of habitat, ecosystem, scenic, and similar values would find Alternative D the least favorable to their preferences. This is because the decisions noted above are the least protective of their values—they maximize rangeland productivity for livestock, facilitate any potential commercial timber harvests, provide the most development-permissive lands and realty program, withdraw the fewest areas from mineral entry, and provide the fewest constraints on oil and gas leasing. In addition, Alternative D designates no ACECs and finds no river segments suitable for "wild" and "scenic" designation.

Summary

All alternatives would allow the reasonably foreseeable coal mine near Alton to continue on a path toward development. This coal mine would provide by far the largest new economic stimulus to the socioeconomic study area of all activities contemplated in the Draft RMP/EIS. However, the population growth associated with the coal mine may lead to new demands and impacts on community services. With respect to other economic implications of the alternatives, while there are some clear differences—for example, in terms of acreages open to or constrained for oil and gas development and acreages related to OHV management—the differences in economic impacts would be relatively small. Most employment and income-generating activity would find ample opportunities under all the alternatives. While few of the economic impacts can be quantified given available information, it is likely there would be some differences in terms of costs of various activities, but little substantial difference between the alternatives in terms of employment and income generation.

All alternatives would have social impacts; some would emphasize certain preferences and interests over others. Alternative A continues most current land management policies and practices, which would be welcomed by some people in and beyond the socioeconomic study area but found less desirable by many others, who see a variety of adverse impacts and foregone opportunities under current management. It is likely that given current trends, conflicts between different resources uses would increase under Alternative A. Alternative B would provide improved management approaches to use of resources that would address many potential resource use conflicts. Alternative B's closure of almost all land to cross-country OHV use (a decision also taken in Alternatives C and D) would produce some impacts on local custom and culture such as some woodland product harvest practices, and would restrict some motorized recreation users of BLM lands. At the same time, Alternative B's preservation of 92 percent of existing OHV routes and provision of increased facilities and other improvements would improve the recreational experience for many motorized recreation users and would reduce some conflicts with non-motorized users. Alternative B would include land treatments to increase livestock forage availability that would be welcomed by livestock grazing interests. Preservation interests would welcome Alternative B's increased constraints on natural resource development. At the same time, natural resource development interests would still find substantial development opportunities available under Alternative B. Alternative C would somewhat favor persons and groups interested in non-motorized recreation and preservation of habitat, ecosystem, visual, and similar values of natural landscapes. However, opportunities for oil and gas development, motorized recreation, and other more traditional uses of BLM lands would still exist under Alternative C. Alternative D would be most preferred by individuals and groups interested in natural resource development and motorized recreation and less favored by those with preferences for less development and use of public lands, although it would still provide important protections for the local environment. Alternative B would probably best balance the multiple interests around uses of BLM public lands.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Irretrievable commitments of socioeconomic resources under this Draft RMP/EIS could include commitments required to address changes brought on by coal mining. These could include commitment of financial and social resources to address community service impacts and social changes that may occur in some communities as a result of population growth due to new employment at the mine. These impacts might be mitigated by new local government financial resources accruing from the mine. An EIS would be needed to determine whether and to what degree these impacts and mitigating revenues would occur. Persons with preservation interests likely would view the loss of some preservation values under Alternatives A and D as an irretrievable commitment of resources, and persons with natural resource development interests likely would see some foregone opportunities under Alternative C and would consider these an irretrievable commitment of resources. It is clear, given current population, visitation, and resource use trends, that all alternatives would have some degree of unavoidable adverse impacts due to conflicts over resource uses. Such conflicts likely would be greatest under Alternative A and probably would be least under Alternative B.

4.5.2 Impacts on Tribal Interests

There are two main types of impacts on Native American tribal interests: 1) damage to or loss of religiously/spiritually significant sites, and 2) actions that affect tribal treaty rights or the ability to access areas/resources for traditional/ceremonial purposes. The BLM coordinates and officially consults regularly with these various Native American tribes/groups to identify and consider their concerns in BLM land use planning and decision-making. Further consultation (as part of this planning effort and during implementation of the RMP) will continue to identify specific sites or areas.

Each alternative has measures to protect cultural resource sites, including those related to traditional uses and practices. Impacts from the alternative decisions to cultural resource sites are discussed and analyzed in the Cultural Resources section. Physical impacts on religiously/spiritually significant sites would not be different than those noted in the cultural resources impact analysis and therefore will not be repeated here. However, religiously/spiritually significant sites differ from more typical archaeological and historical sites because of their sacredness to Native Americans and because the loss of information and damage on the site cannot be mitigated by recovery of scientific information. Federal mandates encourage the BLM to protect these places and to make accommodations to allow their traditional and/or religious use by Native American people to the extent possible within the bounds of other appropriate regulations. Therefore, in addition to the impacts on the physical site noted in the Cultural Resources section, impacts from surface disturbing activities could include a disruption from visual or auditory effects of such actions (e.g., drilling, earth-moving equipment, and automobile traffic). The duration of these impacts are directly related to the duration of the disruptive activity. For example, disruptions from an exploratory oil and gas well would be eliminated upon reclamation (3 to 5 years) while disruptions associated with a surface coal mine would extend over the life of the mine. The spiritual/religious significance and the experience of people on sites at or adjacent to these disturbances would be reduced or lost due to the intrusions. Mitigation identified in the tribal and Section 106 consultation processes would identify measures to reduce impacts to the extent possible. Through the process of mineral development, most of these impacts would be avoidable. However, development of a coal mine in the Alton area could result in the elimination of sites that could be religiously/spiritually significant.

Because no tribal treaty rights or trust responsibilities are known within or mandated by the KFO, management actions on the part of the BLM will have no impact on such rights. The remainder of this section will address impacts on the ability to access areas/resources for traditional/ceremonial purposes.

Under all alternatives, impacts on tribal interests (not including those addressed above) are not anticipated as a result of implementing management actions for the following resources, resource uses, and designations: air quality, soil resources, special status species, fish and wildlife, paleontological resources, livestock grazing, recreation, transportation, minerals and energy, ACECs, WSRs, wilderness, WSAs, and other designations.

Impacts Common to All Alternatives

Identification and Protection of Religiously/Spiritually Significant Sites

Based on the American Indian Religious Freedom Act Amendments of 1994, the BLM will "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions … including but not limited to access to sites … and the freedom to worship through ceremonials and traditional rites." In addition, Executive Order 13007 directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions. Sacred sites

would be identified on a case-by-case basis through consultation efforts with Native American tribes. As these sacred sites are identified, the BLM would protect them and access to them through site-specific means identified on a case-by-case basis.

Alternative A

Identification and Protection of Religiously/Spiritually Significant Sites

Existing land use plans (LUP) do not specifically address tribal issues or Native American religious concerns. Identification and protection of religiously/spiritually significant sites would occur on a case-by-case basis during consultation efforts during planning and analysis of implementation-level activities.

Condition and Accessibility of Resources for Traditional Uses

Existing LUPs to not specifically address tribal issues or Native American access to resources for traditional uses. Identification of areas and species for traditional use, and access to these areas, would occur on a case-by-case basis.

Managing wildland fires based on appropriate management responses that consider the ecological and social costs of fires and suppression could restore vegetation to pre-European settlement conditions. However, if during rehabilitation non-native plant species replaced native plant species culturally important to Native American tribes, there would be a decrease in future opportunities for traditional use of native species. In addition, the threat of invasive species occupying locations where food, medicinal, or raw plant materials are gathered by Native American tribes could reduce the opportunities for future uses. Changes to vegetation composition could also result in changes in traditional use patterns and in their significance or the quality or quantity of the characteristics Native Americans value in these areas (increase or decrease depending on whether the species being used is better adapted to post-European settlement). Areas traditionally used for hunting would be revegetated following wildfire events, resulting in a short-term loss of traditional opportunities, but no long-term impact.

Some of the existing LUPs contain management limiting surface disturbing activities in riparian areas. In these planning units, riparian areas and their associated water would be protected from disturbance. However, all the existing LUPs contain such management. In those areas, development of riparian areas could occur, but with case-by-case site-specific mitigation to meet federal riparian area management policies.

Land Tenure Adjustments

While 80 acres would be available for potential FLPMA Section 203 sale, none of these areas are located adjacent to or near the Kaibab-Paiute Reservation. In addition, these acres do not include any of the areas that the Kaibab-Paiute Tribe requested be made available for disposal.

Alternative B

Identification and Protection of Religiously/Spiritually Significant Sites

Tribal knowledge contributes to the management of cultural resources and traditional use areas or sacred sites. Working with Native American Tribes to protect their rights to practice their religions could result in the identification and management of cultural resource sites and areas for traditional and religious/spiritual uses. Maintaining current agreements and establishing new agreements with Native American Tribes could allow areas of religious concern to be identified and protected for traditional, spiritual, or other uses prior to permitting other activities that could affect these areas. In addition, these agreements could improve communication concerning the consultation process and the specific land

management projects in which the various tribes are most interested. This type of proactive coordination with interested tribes could result in the identification and management of traditional use areas and Native American religious sites prior to disruptive projects being proposed.

Condition and Accessibility of Resources for Traditional Uses

Native American traditional use of vegetation, forest, and woodland resources would be allowed through permits. While requiring a permit would result in the identification of areas and species on a case-by-case basis, the management decisions in the alternative would ensure that opportunities for such uses are allowed.

Implementing up to 22,300 acres of annual vegetation treatments would increase the impacts identified in Alternative A beyond just acres for wildland fires or fuels treatments. These treatments could result in a short-term loss of traditional use opportunities, but in the long term, vegetation conditions would move toward a pre-European settlement state, improving the condition of traditionally used species.

Not allowing surface disturbing activities within 330 feet of riparian areas would protect these areas and their associated water sources. In addition, implementing no surface disturbance at hanging gardens, which are usually associated with springs, would protect these areas that have been noted as ethnographically sensitive.

Land Tenure Adjustments

While 6,400 acres would be available for potential FLPMA Section 203 sale, none of these areas are located adjacent to the Kaibab-Paiute Reservation. The nearest parcels available for sale are three parcels southeast of the town of Kanab. In addition, these acres do not include any of the areas that the Kaibab-Paiute Tribe requested be made available for disposal.

Alternative C

Identification and Protection of Religiously/Spiritually Significant Sites

Impacts from decisions that affect the identification and protection of religiously/spiritually significant sites would be the same as Alternative B.

Condition and Accessibility of Resources for Traditional Uses

Native American traditional use of vegetation, forest, and woodland resources would be allowed through permits. While requiring a permit would result in the identification of areas and species on a case-by-case basis, the management decisions in the alternative would ensure that opportunities for such uses are allowed.

Implementing 4,650 acres of annual vegetation treatments would increase the impacts noted in Alternative A beyond just acres for wildland fires or fuels treatments, but limiting treatment methods to emphasize restoration of natural processes could reduce the rate at which vegetation communities are restored compared to Alternatives B and D. Establishing annual acreages for vegetation and fuels treatments at the minimum level of natural disturbance would manage vegetation more closely to its pre-European settlement condition compared to Alternative A. However, compared to Alternatives B and D, the time required to return the area to its pre-European settlement condition could extend beyond the planning period. These treatments could result in a short-term loss of traditional use opportunities, but in the long term, vegetation conditions would move toward a pre-European settlement state, improving the condition of species traditionally used.

Not allowing surface disturbing activities within 660 feet of riparian areas would protect these areas and their associated water sources. In addition, implementing no surface disturbance at hanging gardens, which are usually associated with springs, would protect these areas that have been noted as ethnographically sensitive.

Land Tenure Adjustments

While 2,700 acres would be available for potential FLPMA Section 203 sale, none of these areas are located adjacent to or near the Kaibab-Paiute Reservation. In addition, these acres do not include any of the areas that the Kaibab-Paiute Tribe requested be made available for disposal.

Alternative D

Identification and Protection of Religiously/Spiritually Significant Sites

Impacts from decisions that affect the identification and protection of religiously/spiritually significant sites would be the same as Alternative B.

Condition and Accessibility of Resources for Traditional Uses

Impacts from decisions that affect the condition and accessibility of resources for traditional uses would be the same as Alternative B.

Land Tenure Adjustments

Making 20,500 acres available for potential FLPMA Section 203 sale would include all the areas the Kaibab-Paiute Tribe requested be made available for disposal except acres within WSAs and several isolated parcels throughout the decision area. Making these lands available for FLPMA Section 203 sale would help the Tribe's interest in obtaining lands within the State of Utah, although they would still have to purchase the land.

Summary

All the alternatives would result in the consideration and/or protection of religiously/spiritually significant sites due to adherence to existing laws and policies. However, proactive coordination with interested tribes under Alternatives B, C, and D could result in the identification and management of traditional use areas and Native American religious sites and improve avoidance and other mitigations to these sites prior to disruptive projects being proposed.

Identification of areas and species for traditional use, and access to these areas, would be available under all alternatives, although Alternatives B, C, and D would require permits. While requiring a permit would result in the identification of areas and species on a case-by-case basis, the management decisions in these alternatives would ensure that opportunities for such uses are allowed.

Each alternative will manage vegetation communities to restore vegetation to pre-European settlement conditions. However, Alternatives B and D would move vegetation to this condition at a faster rate through a full range of vegetation treatment techniques. Treatments under each alternative would result in a short-term loss of traditional use opportunities, but in the long term vegetation conditions would move toward a pre-European settlement state, improving the condition of traditionally used species. Alternatives B, C, and D would provide the greatest level of protection to springs and riparian areas, with Alternative C providing the greatest protection to riparian areas.

While each alternative would provide lands available for FLPMA Section 203 sale, only Alternative D would meet the interests of the Kaibab-Paiute Tribe to be able to purchase lands in Utah adjacent to their

reservation. Other alternatives would provide the opportunities to purchase lands, and under Alternative B lands near the reservation would be available.

Irreversible and Irretrievable/Short-Term Uses Versus Long-Term Productivity/Unavoidable Adverse Impacts

Laws protecting Native American religious/spiritual sites would generally provide for mitigation of irreversible and irretrievable impacts from permitted activities. Cultural sites that are wholly eliminated due to short-term uses such as scientific data recovery efforts and data recovery supporting surface disturbing activities would no longer be available for traditional use of the resources at the site. As such, complete excavation of a site would result in an irreversible and irretrievable commitment of resources. In addition, it may not be feasible to mitigate all of the sites associated with development of a surface coal mine. As a result, some religiously/spiritually significant sites could be lost.

Due to the sacred nature of some traditional uses, areas, and sites, these areas/sites are generally not known or discussed outside of the affected community. There is a potential unavoidable loss of these resources/areas/sites due to non-recognition or lack of information and documentation. This potential would be greatest under Alternative A. Under Alternatives B, C, and D, proactive consultation efforts would improve the potential for these sites to be identified, improving the potential for mitigation of surface disturbing activities.

4.5.3 Impacts on Public Safety

Impacts Common to All Alternatives

The potential for impacts from hazardous material and waste would be low because hazardous waste sites do not currently exist within the decision area. Impacts would be further limited through federal regulation of hazardous materials, substances, and waste; national contingency plans; BLM policy on hazardous waste disposal; and continued coordination with federal and state partners regarding hazardous materials and waste issues (e.g., abandoned mine lands). BLM-administered public land sites contaminated with hazardous wastes would be reported, secured, and remediated according to applicable federal and state regulations and contingency plans. Such efforts would be costly and likely involve several regulatory agencies and other entities or individuals. If remediation of a large hazardous waste site was necessary, considerable funding would be required for the public health and safety program, which could result in significant impacts. Because hazardous waste sites do not currently exist within the decision area, the potential for this to occur would be low.

The BLM would work with the State Abandoned Mine Lands (AML) program to identify and close/render sites safe and help ensure program funds are made available. On sites where the BLM shares ownership with other entities, cooperative efforts with the State of Utah to address remediation needs would be required. Evaluating all AML sites to determine effective methods for remediation would require substantial effort and funding over the 20-year planning period. Conducting actual remediation efforts would greatly increase costs associated with managing the public health and safety program.

4.6 CUMULATIVE IMPACTS

Cumulative impacts are the effects on the environment that result from the impact of implementing any one of the alternatives in combination with other actions outside the scope of this plan, either within the planning area or outside it. The CEQ regulations for implementing NEPA define cumulative impacts as:

> *"…the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1500-1508)*

Cumulative impact analysis is required to evaluate the environmental conditions that result from many different factions that act together. The real effect of any single action cannot be determined by considering that action in isolation but must be determined by considering the likely result of that action when acting in conjunction with many others. Management decisions may well be influenced by activities and conditions on intermingled non-public lands and on adjacent lands beyond the planning area boundary. Therefore, assessment data and information may span multiple scales, landownerships, and jurisdictions. These involve determinations that are often complex and to some degree subjective.

4.6.1 Cumulative Analysis Methodology

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment and specifically actions that occur outside the scope and geographic area covered by the RMP. Because of the programmatic, broad-scale nature of this RMP, this assessment is broad and generalized to address potential effects that could occur from a hypothetical management scenario when combined with other activities or projects. This assessment is primarily qualitative for many resources because of the lack of detailed information that would result from project-level decisions and other activities or projects.

Cumulative impact analysis is limited to important issues of national, regional, or local significance. Therefore, not all issues identified for direct or indirect impact assessment in this EIS are analyzed for cumulative effects. Because of the wide geographic scope of a cumulative impact assessment and the variety of activities assessed, cumulative impacts are commonly examined at a more qualitative and less detailed level than are the direct and indirect impacts presented previously in this chapter. This analysis includes discussion of factors that have created the current environment. These past actions are considered cumulatively with the alternatives of this RMP. Factors that could be expected to influence that environment in the future are also considered.

The spatial boundaries of each resource cumulative analysis, known as the cumulative impact analysis area, vary by resource and are larger for resources that are mobile or migrate compared to resources that are stationary. In some cases, spatial boundaries may be contained within the planning area or an area of the planning area. Evaluation of potential impacts considers incremental impacts that may occur resulting from the proposed project, while also considering impacts from past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those future action activities that have been committed to or that are known proposals that could take place within the 20-year planning period. Reasonably foreseeable future action scenarios are projections made only for the prediction of future impacts; they are not actual planning decisions or resource commitments.

Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in such factors as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected for this analysis.

The following factors were considered in this cumulative impact assessment:

- Federal, non-federal, and private actions
- The potential for synergistic effects or synergistic interaction among or between effects
- The potential for effects to cross political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- The comparative scale of cumulative impacts across alternatives.

4.6.2 Past, Present, and Reasonably Foreseeable Future Actions

Projects and activities were identified through review of available information. The following general types of projects were identified as having the greatest likelihood of generating potential cumulative impacts:

- Regional minerals and energy projects
- Water projects
- Road improvement projects
- Neighboring land use planning and development.

Other potential future actions have been considered and eliminated from further analysis because there is only a small likelihood of these actions being pursued and implemented within the life of the plan or because there is so little known about the potential action that formulating an analysis of impacts would be premature. In addition, potential future actions that protect the environment (such as new, potentially threatened, or endangered species listings or regulations related to fugitive dust emissions) are unlikely to create significant environmental effects alone or in combination with this planning effort. Federal actions such as species listings would require the BLM to reconsider the decisions created from this plan because the consultations and relative impacts may no longer be appropriate. These potential future actions may have greater capacity to affect the resource uses within the decision area. However, until more information is developed, no reasonable estimate of impacts can be developed.

Continued surface disturbing activities are foreseeable actions anticipated in the decision area. Some management actions related to these uses have been considered within the range of the alternatives, but the continued existence of these activities is driven by the multiple-use mandate and will occur unless another legislative action intercedes. The potential cumulative impacts of these land uses are then inherent and are not clearly identifiable because these uses are historically connected to the condition of the land.

Data on the precise locations and overall extent of the resources within the decision area is considerable; however, it varies according to resource type and locale. Further, the understanding of the impacts on and the interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce potential cumulative impacts in accordance with law, regulations, and the final RMP.

Regional Minerals and Energy Projects

West-Wide Energy Corridor Programmatic EIS

The Proposed Action in this Programmatic EIS is to designate corridors on federal land in the 11 western states for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. The Energy Policy Act of 2005, Section 368, Energy Right-of-Way Corridors on Federal Land, required agencies to designate energy corridors, taking into account the need for upgraded and new electricity transmission and distribution facilities in order to improve reliability, relieve congestion, and enhance the capability of the national grid to deliver electricity.

The project requires the federal agencies to cooperate using their respective authorities to (1) designate corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on federal land in the 11 contiguous western states; (2) perform any environmental reviews that may be required to complete the designations of such corridors; and (3) incorporate the designated corridors into the relevant agency land use and resource management plans or equivalent plans.

BLM Wind Energy Development Programmatic EIS and Wind Energy Development Program

A December 2005 Record of Decision on the Programmatic EIS for wind energy development where appropriate on BLM-administered public lands in the western states amended several LUPs. Although the EIS identifies areas where development would be incompatible (wilderness, critical habitats, etc.), it prescribes BMPs for wind energy development projects on the public lands. The programmatic EIS is intended to facilitate this form of renewable energy development on suitable areas of the public lands.

Coal Mine Development of Private Coal Resources in the Alton Area

The State of Utah is considering an application to surface mine privately owned coal resources associated with the Alton Coal Lease Tract in Kane County. The privately owned tracts are adjacent to federally administered coal resources the BLM is considering for competitive leasing, as described in Chapter 3 and the Reasonably Foreseeable Development Scenario (Appendix I). The tract is proposed for development by surface mining methods to ensure maximum economic recovery of the resource.

The development of private coal resources (fee coal) would occur as part of development of the federal coal resources administered by the BLM. Preliminary plans would be to mine the coal from private surface/federal subsurface (approximately 1,300 acres) first and then expand onto adjacent federal surface/federal subsurface (approximately 2,300 acres). In addition to the mining of federal coal, preliminary plans would be to mine coal from private surface/fee coal (approximately 800 acres) for a total cumulative surface disturbance of 4,400 acres in the planning area. The average annual total surface disturbance would be approximately 220 acres.

Water Projects

Lake Powell Pipeline

The State of Utah Board of Water Resources and Washington, Kane, and Iron counties are pursuing the construction of a pipeline that would run from Lake Powell to Sand Hollow Reservoir. The pipeline would originate at Lake Powell, near the Glen Canyon Dam, and would deliver water to Sand Hollow Reservoir, located approximately 10 miles east of St. George. The Lake Powell pipeline would consist of roughly 120 miles of estimated 66-inch pipe from Lake Powell to Sand Hollow Reservoir and 38 miles of 30-inch pipe from Sand Hollow to Cedar City. The corridor is anticipated to be 3,000 feet wide. As part

of the initial feasibility studies, various alternative alignments are being investigated in an effort to identify the least costly alignment that would have minimal impact on the environment.

The pipeline is being proposed in order to meet the water demands of the growing population in southern Utah. The 158 miles of pipeline would bring 70,000 acre feet of water to Washington County, 10,000 acre feet to Kane County, and 20,000 acre feet to Iron County. The pipeline would probably exceed $494 million in current dollars. The Lake Powell pipeline would allow Utah to tap into the Upper Colorado River water.

The pipeline is most likely a project that is several years in the making. Prior to construction of the pipeline, additional engineering and financial feasibility studies must be completed and ROWs and various permits and agreements obtained. An extensive environmental review of the proposal to build the pipeline will be conducted, and stakeholder and public input will take place. The actual construction of the pipeline is estimated to last 3 years.

Jackson Reservoir–Kane County Water Conservancy District

The Jackson Reservoir is proposed on non-BLM-administered lands. The reservoir could change flow regimes and water quality parameters south of Kanab (Kanab Creek fifth level Hydrologic Unit Code [HUC]). In addition, the construction of the reservoir could increase the demand for mineral materials.

Road Improvement Projects

Expansion of U.S. Highway 89

U.S. Highway 89 is anticipated to be widened over the next 20 years. The widening of the highway would allow for an increase in traffic volume. In addition, portions of the highway would be developed into a four-lane divided highway.

Neighboring Land Use Planning and Development

Conversion of Land Use

Conversion of agricultural lands to residential and commercial uses would increase the demand for groundwater sources to support these additional uses. The conversion of these lands would make remaining undeveloped lands more important for wildlife habitat and other resource uses.

Management of Adjacent Lands

Activities on adjacent lands could affect public land in the decision area, general public land management on adjacent lands, and management of private and state lands. There are no major projects identified on these lands, but there are differences or similarities in management.

Areas managed by federal land management agencies include:

- St. George BLM Field Office
- Richfield BLM Field Office
- Arizona Strip BLM Field Office
- Grand Staircase-Escalante National Monument (GSENM)
- Dixie National Forest
- Fishlake National Forest
- Glen Canyon National Recreation Area

- Bryce Canyon National Park
- Zion National Park.

Each of these areas has a LUP to guide the management of federal lands in these areas.

4.6.3 Cumulative Impacts by Resource

Air Quality

Dispersed recreation, prescribed burning activities, and mineral and energy development cause emissions of particulate matter, carbon monoxide, nitrogen oxide, sulfur dioxide, and VOC emissions currently below regulatory thresholds. In the future, these emissions could impact ambient air quality, visibility, and atmospheric deposition. The cumulative impact analysis of air quality within and near the planning area includes major sources such as coal-fired power plants and cogeneration facilities. No other RFD would increase regulated pollutants in the area.

Data provided by KFO staff was used to determine the baseline conditions after the development of proposed energy resources was complete. In addition, emissions data was gathered for the area. The most recent Utah Division of Air Quality (UDAQ) Statewide Emissions Inventory Report shows the primary air pollutants in Garfield and Kane counties is VOCs, followed by carbon monoxide (CO), PM_{10}, Nitrogen Oxides (NO_x), Sulfur Oxides (SO_x), and $PM_{2.5}$. Table 4-39 shows the criteria pollutant levels in tons per year from the Statewide Emissions Inventory. The 2002 emissions from the sources in Kane and Garfield counties are 182,641 tons per year (UDAQ 2002). The emissions from future BLM activities for all alternatives range from 3,325 tons to almost 3,670 tons per year (**Table 4-8**). Emissions from proposed actions from BLM activities in the decision area will contribute approximately 1/10 of a percent of the emissions of the State of Utah and 2 percent of the sum of emissions from Garfield and Kane counties.

Table 4-39. 2002 Criteria Pollutant Inventory (tons per year)

Area	PM_{10}	$PM_{2.5}$	SO_x	NO_x	VOC	CO	TOTAL
Garfield	5,155	4,024	95	1,638	51,387	57,471	115,746
Kane	750	205	89	564	48,948	16,544	66,895
Utah Total	**82,439**	**23,288**	**49,090**	**205,313**	**911,310**	**1,314,041**	**2,562,193**
Utah Average	**3,053**	**1,208**	**1,818**	**7,604**	**33,752**	**48,668**	**94,895**

Sources: (UDAQ 2002) and (UDAQ 2003)

Considering that the permitted sources do not calculate emissions from some of the oil and gas sources and that the permitted emissions come from single point sources, the future anticipated emissions from BLM activities will be low in comparison to existing sources.

Soil Resources

The cumulative impact analysis boundary for soil resources is the planning area and the fifth order watersheds that intersect the planning area boundary. BLM management actions combined with the proposed construction and development of the Lake Powell pipeline, coal development activities, development of the West-wide energy corridor, and construction of the Jackson Reservoir could increase localized erosion and decrease soil productivity, which could degrade downstream water quality. However, permitted activities would comply with authorizing permit stipulation that would minimize soil erosion and loss of soil productivity.

Water Resources

The cumulative impact analysis boundary for water resources is the planning area and the fifth order watersheds that intersect the planning area boundary. BLM management actions combined with the proposed construction and development of the Lake Powell pipeline, coal development activities, development of the West-wide energy corridor, and construction of the Jackson Reservoir could increase localized erosion and sediment loading, which could degrade downstream water quality. However, permitted activities would comply with authorizing permit stipulations that would minimize soil erosion and degradation of water quality. Fire use and vegetation treatments under the action alternatives would improve watershed health, which could increase the ability of the watershed to retain moisture. This could increase the volume of water within the watershed.

Vegetation

The cumulative impact analysis boundary for vegetation includes the entire decision area. Potential cumulative impacts on vegetation would occur from a combination of activities and land uses occurring within the analysis boundary. Such impacts would result primarily from vegetation treatments, surface disturbing activities, and general human disturbance.

Loss of vegetation could result from surface uses and disturbances such as minerals development, ROW development, and open OHV use, which could alter the composition and structure of vegetation communities; increase the potential for the introduction and establishment of noxious weeds; and reduce species diversity, primary production, and the recruitment of new plants. Surface disturbance in riparian/wetland areas under all alternatives could decrease riparian/wetland functioning conditions. Alternative A would result in the most potential for surface uses and disturbances, whereas Alternative C would result in the least.

Under Alternative A, past fire suppression has contributed to increasing pinyon-juniper encroachment in the decision area and to a concurrent decrease in aspen and ponderosa pine communities. Fire use and vegetation treatments under the action alternatives would generally maintain or improve vegetation communities by removing undesired species, increase species diversity and age class, improve vegetation composition and structure, and increase vegetation cover. In addition, vegetation treatments and range improvements on lands adjacent to the decision area (public and private) would increase available forage and water for wildlife populations and livestock (for use by private operators) in these areas. This also would improve distribution of livestock and wildlife, improving vegetation condition. This would result in healthier vegetation communities that are more capable of retaining moisture and nutrients and resisting disease, non-native species invasion, drought, and other natural disturbances and stressors.

Special Status Species (Threatened, Endangered, and Sensitive)

The cumulative impact analysis boundary for effects on special status species is the planning area and the watershed boundaries that intersect the planning area. The development of the Lake Powell pipeline, highway construction, and ROW corridors proposed under the West-wide energy project would result in a loss of habitat for special status species wildlife and plants and could temporarily displace special status species wildlife from these areas. The conversion of land use from agricultural lands to residential and commercial uses would increase the habitat values of undeveloped land. The change in land use could result in the loss of foraging and nesting habitat for some special status species. Management of adjacent lands would affect habitat conditions and special status species populations. Because the majority of adjacent lands are federally managed, special status species habitat values must be considered through federal landscape and activity planning. The surface development of private coal resources in the Alton area (approximately 800 acres) (Appendix I) would eliminate the southern-most lek of the Greater sage-

grouse. Combined with mining operations on adjacent lands with federally administered coal resources (approximately 3,600 acres), this could result in the long-term loss of the local sage-grouse habitat and displacement of individuals. While mitigation and reclamation could reduce the impacts, development of the coal mine could result in the displacement or loss of the local population. Under Alternative D these cumulative impacts would have the greatest potential for habitat alteration and displacement.

Fish and Wildlife

The cumulative impact analysis boundary for effects on fish and wildlife is the planning area and the watershed boundaries that intersect the planning area. The development of the Lake Powell pipeline, highway construction, and the ROW corridors proposed under the West-wide energy project would result in a loss of habitat and could temporarily displace wildlife from these areas. The conversion of land use from agricultural lands to residential and commercial uses would increase the habitat values of the remaining undeveloped land. The change in land use could result in the loss of habitat for some wildlife species. Management of adjacent lands would affect habitat conditions and wildlife populations. Because the majority of adjacent lands are federally managed, fish and wildlife habitat values must be considered through their landscape and activity planning. In addition, UDWR management of herd levels, including herd objectives and herd harvest levels, would directly affect wildlife populations and associated levels of use of habitat. Vegetation treatments and range improvements on lands adjacent to the decision area (public and private) would increase available forage and water for wildlife populations and livestock (for use by private operators) in these areas. This also would improve distribution of livestock and wildlife, improving vegetation condition. Under Alternative D these cumulative impacts would have the greatest potential for habitat alteration and wildlife displacement.

Wildland Fire Ecology

Effects on fire frequency, intensity, and suppression activities resulting from actions taken by the BLM within the decision area would combine with similar effects caused by activities sponsored by other groups and private interests to create cumulative impacts on fire management within the analysis boundary. As development, recreational activities, and general use of the area increased, so would the number of potential ignition sources and consequently the probability of wildland fire occurrence, which would increase the need for federal, state, and local agencies to suppress wildland fires to protect life, property, and sensitive resources. Furthermore, development of the area also would increase the amount of Wildland-Urban Interface (WUI) areas, which would put additional pressure on fire suppression efforts because these are high-priority areas for fire suppression. Suppression activities within WUI areas could be more dangerous, time-consuming, and expensive than suppression in undeveloped areas. In addition, activities associated with fire suppression, recreation, development, and general land use would cumulatively contribute to the modification of the composition and structure of vegetation communities and increase the spread of noxious and invasive weeds. Such effects would, in turn, alter the fire regime of the area, potentially increasing the frequency, size, and intensity of wildland fires. Developed areas and associated roads and ROW corridors could also provide increased accessibility to remote areas for fire suppression equipment and provide fuel breaks in the case of wildland fire events.

Cultural Resources and Tribal Interests

Impacts associated with resource decisions from this RMP, combined with other past, present, and reasonably foreseeable actions, could produce cumulative impacts on cultural resources and resources of religious or traditional importance to Native American tribes associated with the decision area. The cumulative impact analysis area for cultural resources includes the planning area and neighboring lands with connected cultural resources, including parts of the GSENM, Iron and Piute counties, and the Kaibab-Paiute Reservation lands.

Land management of adjacent federal lands would provide protection for cultural resources throughout the region. Required inventories prior to surface disturbance would increase the number of identified sites and decrease the potential for damage from surface disturbing activities. Similar management direction and resource uses occur in these planning areas. In addition, any surface disturbance associated with water projects, regional minerals, or energy projects would require adherence to cultural resource laws and regulations, resulting in the inventory and identification of cultural sites and in some cases data recovery.

In general, implementation of the array of resource decisions under Alternative C would have the lowest degree of potential negative impact on cultural resources because of its restrictions on surface disturbing activities and vegetation manipulation projects. By comparison, Alternative A has the highest levels of potential impact on cultural resources due to lack of restrictions on OHV use and limited restrictions on other uses. Under all the alternatives, cultural resources would be managed in compliance with federal law, regulation, and policies that require the preservation of cultural resources either in place or through data recovery.

Potential congressional designation of WSR segments would require a Class III cultural resource survey to identify and monitor cultural resources. Some cultural resources would require additional mitigation as a result of public interaction with the resource.

Paleontological Resources

The cumulative impact analysis boundary for paleontological resources includes the decision area and neighboring lands with connected paleontological resources. Management activities on adjacent federal lands would provide protection for paleontological resources throughout the region. Inventories prior to surface disturbance would increase the number of identified localities and decrease the potential for damage from surface disturbing activities. These inventories also would increase the knowledge of the region's paleontological resources.

The cumulative effects of surface disturbing activities within paleontological Class I areas, especially mineral development in the region, have the potential to damage this fragile, non-renewable resource. However, existing laws, regulations, and policies provide for mitigation of effects through avoidance or data recovery efforts. Although it is expected that some fossils would be destroyed in the course of legitimate uses of public lands, mitigation measures likely would bring paleontologists to areas where fossils had not been previously studied. Thus, fossils that would otherwise have disintegrated over time due to weathering and erosion would be collected, placed in repositories, and protected in perpetuity. Beyond mineral development, cumulative impacts on paleontological resources could occur through incremental degradation of the resource base from a variety of sources, reducing the information and interpretive potential of the paleontological resource values. Mineral development on lands that are not protected by federal laws or policies protecting paleontological resources could decrease the regional resource base, increasing the scientific value of the paleontological resources within the decision area.

Visual Resources

The cumulative impact analysis boundary for visual resources includes the decision area and neighboring lands within the viewshed that overlap the decision area.

Development actions within and outside the decision area could produce long-term cumulative impacts on visual resources. Reasonably foreseeable future actions, including planning efforts to locate and develop mineral and hydrocarbon resources and establish ROW corridors, would have impacts on visual resources. Impacts would be caused by surface disturbance from production, exploration, and

construction of drilling and mining facilities and development within ROWs. However, these projects would be required to conform to an area's VRM Class objectives. Projects in VRM Class I and II areas could be required to conform to these VRM Class objectives through design, camouflage, and/or topographic screening, which would prevent their cumulative impacts on visual resources from becoming dominant features on the landscape in sensitive VRM Class designations. Cumulatively, Alternative C would provide the greatest protections to visual resources because the 268,300 acres (48%) of VRM Class I and II would be in addition to restrictions on development on adjacent National Parks, National Monuments, Glen Canyon National Recreation Area, and wilderness areas. VRM Class III and IV area objectives in the decision area would not emphasize protection of an unmodified landscape and visual resources and would allow for major modifications to the landscape. Activities that occur in these areas could result in greater change to the characteristic landscape and may not protect scenic values.

Continued recreational OHV use also would maintain the various routes throughout the decision area. Alternatives A and D would have the greatest cumulative impact because they would manage the largest number of designated routes. Alternative C would manage the fewest miles of designated routes, resulting in the smallest potential for cumulative impacts from the landscape contrast associated with linear route disturbances.

The growing need to decrease the potential for catastrophic fire in the region through mechanical treatments aimed at reducing fuel loads would gradually alter landscapes where treatments are conducted. Vegetation treatments would change the vegetation component of the landscape, and thus its visual character. The degree of change would vary depending on the vegetation type, size of the treatment area, and treatment method. For example, vegetation treatments in pinyon and juniper vegetation communities would be more visually apparent than vegetation treatments in sagebrush communities. Smoke from prescribed fires used for the same purpose would sporadically affect the quality of viewsheds and interfere with the public's viewing of scenery.

Areas with Wilderness Characteristics (Wilderness, WSAs, Non-WSA Lands with Wilderness Characteristics)

The cumulative impact analysis boundary for areas with wilderness characteristics (designated wilderness, WSAs, WC areas) includes areas within the planning area with identified wilderness characteristics and the full extent of those areas that overlap outside the planning area. In addition, areas with wilderness characteristics of adjacent land management agencies were considered as cumulative management of adjacent lands described above (Table 4-40).

Table 4-40. Acres of Areas with Wilderness Characteristics in the Cumulative Impact Analysis Boundary

Area Name	Designated Wilderness[a]	WSAs (BLM)/Forwarded to Congress (NPS)[a]	WC Areas (BLM)/Potential & Proposed for Wilderness (NPS)[a]	Total Areas with Wilderness Characteristics[a]
Kanab Field Office	21,200	53,900	89,780	**164,880**
Dixie National Forest[1]	25,600	0	0	**25,600**
Arizona Strip Field Office[2]	80,765	0	34,942[b]	**115,707**
St. George Field Office[3]	2,690	94,916	0	**97,606**

Area Name	Designated Wilderness[a]	WSAs (BLM)/Forwarded to Congress (NPS)[a]	WC Areas (BLM)/Potential & Proposed for Wilderness (NPS)[a]	Total Areas with Wilderness Characteristics[a]
Grand Staircase-Escalante NM[4]	0	881,997	457,049	**1,339,046**
Vermilion NM[2]	89,825	0	37,566[b]	**127,391**
Grand Canyon/ Parashant NM[2]	95,150	0	215,345[b]	**310,495**
Zion NP[5]	0	120,620	11,995	**132,615**
Bryce Canyon NP[6]	0	20,810	0	**20,810**
Glen Canyon National Recreation Area[6]	0	0	637,250	**637,250**
Cedar Breaks NM[6]	0	4,830	0	**4,830**
Capitol Reef NP[6]	0	179,815	4,050	**183,865**
Grand Canyon NP[6]	0	0	1,111,902	**1,111,902**
Lake Mead National Recreation Area[6]	0	0	561,300	**561,300**
Totals	**315,230**	**1,356,888**	**3,161,179**	**4,833,297**

Notes:
a - All figures are shown in acreages.
b - Not acres of WC areas, but acres of WC areas proposed to be managed to maintain wilderness characteristics in the Proposed RMP/Final EIS.
Sources: 1 - USFS 2006, 2 - BLM 2007, 3 - BLM 1999b, 4 - BLM 2000, 5 - NPS 2001b, 6 - NPS 2003

As a result of implementing the management prescriptions under Alterative C, wilderness characteristics on approximately 89,780 acres of areas with wilderness characteristics would be maintained within the decision area. Because of BLM WSA management, management of existing wilderness by the BLM and USFS, and management of lands endorsed for wilderness by the NPS, Alternative C would manage to protect wilderness characteristics on 4,376,248 acres throughout the region (all areas except WC areas within GSENM, which are not specifically managed to protect their wilderness characteristics). Under Alternatives A, B, and D, where no acres of WC areas in the decision area are fully protected, no fewer than 4,286,468 acres of areas with wilderness characteristics would remain protected within the region. When analyzed in light of these other areas, the potential impacts on the WC areas within the decision area—greatest under Alternative A, and second highest under Alternative D—would contribute to a loss of areas with wilderness characteristics in the region. However, the number of acres being protected for their wilderness characteristics in the region is much larger. In this context, the loss of wilderness characteristics on less than 1 percent of the WC areas in the decision area due to actions analyzed in Section 4.2.11 (Impacts on Non-WSA Lands with Wilderness Characteristics) would not result in a significant loss of these resources in the region.

Under Alternatives A, B, and D, designation of a West-wide energy corridor, as proposed in the West-Wide Energy Corridor Programmatic EIS, would result in a 3,500-foot-wide ROW corridor being established through 1,580 acres of the Upper Kanab Creek WC area and across 400 acres of the eastern portions of the Vermilion Cliffs WC area. The portions of the Upper Kanab Creek WC area east of the proposed energy corridor (9,690 acres) would remain at more than 5,000 acres and would retain its wilderness characteristics, as would the Vermilion Cliffs WC area. Development of ROWs within the corridor would remove opportunities for solitude and primitive recreation during construction. The

surface disturbance associated with the development would eliminate naturalness in these portions of the Upper Kanab Creek and Vermilion Cliffs WC areas. Following construction activities, naturalness would remain impacted for above-ground facilities, while reclamation of subsurface ROWs would reduce the loss of naturalness.

Under Alternative C, all the WC areas within the decision area would be excluded from ROWs; therefore, the West-wide energy corridor would have to be re-routed to avoid these areas, preserving the wilderness characteristics of these areas. Most of the other reasonably foreseeable actions would not coincide with the WC areas within the decision area.

Use and/or development of non-federal land inholdings within the Moquith Mountain and Parunuweap WSAs and the Paria Canyon-Vermilion Cliffs Wilderness could result in the loss of wilderness characteristics in portions of these areas. Based on the "Cotter Decision" (*State of Utah v. Andrus, 1979*), "BLM is obligated to provide reasonable access to State sections." The decision notes that the BLM can regulate the method and route of access to State of Utah School and Institutional Trust Lands Administration (SITLA) lands encircled by federal land; however, the regulation may not prevent the State or its lessee from gaining access to its land, nor may it be so prohibitively restrictive as to render the land incapable of full economic development. While there has been no current demand for access to these sections, such actions could occur within the planning window. Providing access could eliminate wilderness characteristics in the areas adjacent to the access routes. The magnitude and duration of the impact would depend on the location of the route, type of access, and type of development being supported by the access. Because designated wilderness and WSAs would be managed to maintain their wilderness characteristics, impacts would be mitigated and likely would result in only localized and short-term disturbance.

Forestry and Woodland Products

The cumulative impact analysis boundary for forest and woodland products is the planning area and watersheds that intersect the planning area. The availability of other forest and woodland products on adjacent lands could reduce the demand for these products within the decision area.

Livestock Grazing

The cumulative impact analysis boundary used to analyze cumulative impacts on livestock grazing includes all grazing allotments within the planning area. Potential, cumulative impacts on livestock grazing operations could occur from a combination of activities and land uses occurring within the analysis boundary. Such impacts could result primarily from vegetation treatments, surface disturbing activities, the presence of grazing wildlife, and general human disturbance. Vegetation treatments and range improvements on lands adjacent to the decision area (public and private) would increase available forage and water for wildlife populations and livestock (for use by private operators) in these areas. This also would improve distribution of livestock and wildlife, improving rangeland conditions. In addition, vegetation treatments designed to enhance rangeland conditions would generally result in long-term increases in forage production. This could also result in short-term forage loss and livestock displacement directly in the areas of treatment.

Existing and future surface disturbing activities, recreation use, and big game populations located within the analysis boundary could reduce forage available for livestock and cause a cumulative increase in soil disturbance, vegetation removal, spread of noxious weeds, and livestock displacement. Impacts would generally be greater in areas with large populations of big game and in areas of intense surface disturbance. These impacts could result in changes in rangeland health and jeopardize compliance with the *Standards for Rangeland Health* on some allotments. If livestock grazing is considered to be a factor

in violating the Standards, the responsible livestock operator could be required to make adjustments to grazing practices.

Surface disturbing activities, including coal development activities and related construction of roads and infrastructure, could be a primary cause of site-specific loss of forage and the spread of noxious weeds. The implementation of BLM's mitigation guidelines, restrictions on surface use, *Standards for Rangeland Health*, vegetation treatments, and monitoring efforts would all provide measures of protection for forage resources on federal lands, which would help to reduce overall effects on livestock grazing operations.

Recreation

The cumulative impact analysis boundary used to analyze cumulative impacts on recreation resources includes the planning area and all big game herd units that intersect the planning area. Because hunting is a major recreation activity within the planning area, any activities that affect game populations would in turn impact recreation opportunities and experience.

Cumulative impacts on recreation would potentially occur from a combination of land uses that result in conflicts for unconfined and primitive recreation opportunities. Such impacts are a result of increased recreational activity occurring within and outside of the planning area and other conflicts generated from permitted actions. Conflicts among recreationists would result in a major impact on the recreation setting and experience. Motorized recreation use would conflict with primitive/unconfined recreation when they occur in close proximity and would result in degradation of the setting and experience associated with primitive/unconfined recreation activities.

Cumulative impacts on recreation opportunities, setting, and experience would be greater under Alternatives A and D because restrictions on surface development and protections afforded to natural resources within the planning area would be less intensive under these alternatives. Alternative C would provide the greatest protection to natural resources and the highest level of non-motorized recreation opportunities.

Transportation

The cumulative impact analysis boundary includes the planning area and immediately adjacent segments of state and local road networks. These road networks include routes shared with the BLM and other federal agencies and routes shared with the GSENM. Cumulative impacts on transportation and access would primarily occur from actions that facilitate, restrict, or preclude motorized access. Management actions that restrict OHV use would limit the degree of travel opportunities and the ability to access certain portions of the planning area. The continued maintenance of federal and state highways would provide arterial connections to BLM system roads. County-maintained routes that connect federal and state highways to BLM system routes would maintain and improve access to the decision area's resources.

Lands and Realty

The cumulative impact analysis boundary for lands and realty include the planning area and segments of ROW corridors that intersect its boundaries. The ROWs and ROW segments are maintained by state or local agencies, adjacent BLM field offices, and other federal agencies. The Lake Powell pipeline, West-wide energy corridor, expansion of U.S. Highway 89, and development along U.S. Highway 89 and SR 12 could affect the lands and realty program. These projects and developments would require approval of ROWs that cross the decision area. Under Alternatives A, B, and D, restrictions on ROWs in the decision area, combined with restrictions from other management plans in the planning area, would have a minor

cumulative effect by reducing routing options and possibly increasing construction costs for utilities. Under Alternative C, all the WC areas within the decision area would be excluded from ROWs; therefore, the West-wide energy corridor would have to be re-routed to avoid these areas. This could increase expenses for planning, development, and construction to re-route ROWs to avoid these areas.

Minerals and Energy

The cumulative impact analysis boundary for minerals and energy resources varies by the type of mineral resource. The cumulative impact analysis boundary for oil and gas is the planning area and contiguous geological structures and oil and gas fields that intersect the planning area. The cumulative impact analysis boundary for coal is the planning area and the boundaries of adjacent coal fields (Alton, Kaiparowits, and Kolob). The cumulative impact analysis boundary for locatable minerals is the planning area. The cumulative impact analysis boundary for mineral materials is the planning area and adjacent mineral material sources. The development of the West-wide energy project could lead to an increased interest in oil and gas activities. Stipulations on oil and gas leasing in the decision area would have a minor cumulative effect on the ability to develop oil and gas resources. The expansion of U.S. Highway 89 and continued development along U.S. Highway 89 and SR 12 and in local communities could increase the demand for mineral materials. The mineral material closures in the decision area would have a minor cumulative effect on the ability develop mineral materials.

Areas of Critical Environmental Concern

The cumulative impact analysis boundary for ACECs is the potential ACEC boundaries. Cumulative impacts from the implementation of other resource decisions within and outside of the decision area on currently designated and potential ACECs would be minimal, with the exception of mineral and OHV decisions. The nature of the R&I values associated with the potential ACECs tends to result in impacts that occur quickly but recover slowly, if at all in the case of some visual impacts and impacts on cultural sites. As such, any impact would result in a cumulative increase in the potential for irreparable damage to R&I values. The potential for such damage to potential ACECs would be greatest under Alternative D, which designates no ACECs. Alternative C would result in the lowest potential for cumulative impacts resulting in irreparable damage to R&I values. In that alternative, all potential ACECs would be designated and would have special management to protect their R&I values.

Wild and Scenic Rivers

Any cumulative impact that would be associated with WSRs would occur from Congress designating a suitable river segment into the NWSRS. Impacts would result from the river being managed to maintain its classification, free-flowing nature, and ORVs. Impacts likely would not occur because eligible rivers are reviewed during the suitability process, and suitability is based on the environmental and economic consequences that would result from designation. Because the BLM has no control over potential modification to a river's shoreline or any other form of development on non-public lands, impacts could occur in these areas. Management actions to pursue land acquisitions of non-BLM lands to accomplish resource management goals would provide opportunities to manage ORVs and to mitigate any efforts that could impact the river's tentative classification or free-flowing nature.

Other Designations

The cumulative impact analysis boundary for the Old Spanish National Historic Trail is the extent of the Old Spanish National Historic Trail. Adjacent federal land management agencies would be required to provide protection to this national designation. However, development on state and private land through scattered BLM land associated with both segments could decrease the historic character of the landscapes.

In addition, road improvement projects and water projects could result in additional development within the segments of the Old Spanish National Historic Trail. These could cumulatively reduce the historic character of the landscapes associated with both segments. Impacts from Alternative A, combined with the management of adjacent land management agencies and development projects, could result in cumulative loss of historic character on all of both segments. Impacts from Alternatives B, C, and D would maintain some of the character of the Highway 89/20-Garfield County segment, especially on the northern portions of that segment, regardless of cumulative actions.

The cumulative impact analysis area for byways and backways is the extent of the ways. Cooperating with the managing authorities of the byways and backways to protect and preserve the associated landscape values would maintain and enhance these values and provide for heritage tourism opportunities. This cooperation could be accomplished through implementation-level planning and site developments that could interpret these resources and provide expanded visitor services in the area.

Social and Economic Conditions

The cumulative impact analysis boundary for social and economic conditions is the socioeconomic study area, which includes the entirety of Garfield and Kane counties. Such impacts would include economic and social impacts related to short-term economic stimuli and possible short-term local community service impacts related to major construction projects and resource extraction activities in the socioeconomic study area. In addition to the coal mine on decision area lands, such major projects also would include the following, if and when they occur: the Lake Powell pipeline, construction of a divided highway parallel to U.S. Highway 89, an energy pipeline through the area, Jackson Reservoir (proposed by the Kane County Water Conservancy District), and development of tar sands in Glen Canyon. These projects also would cumulatively affect the demand for mineral materials (sand and gravel) from BLM lands. Conversion of private agricultural lands to residential and other uses as the area grows would cumulatively add to the importance of BLM public lands to maintenance of the economy and culture of livestock grazing. The importance of BLM public lands to maintenance of other local livelihoods, customs, and culture also would depend on cumulative decisions regarding management of other lands in the area, including NPS, USFS, BLM, GSENM, State, and private lands.

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