

CHAPTER 4

Environmental Consequences



4.0 CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter describes and compares the environmental consequences that may result from implementing the five alternatives presented in Chapter 2. In terms of complying with the NEPA, the specific purpose of this chapter is to present the analyses of the alternative management actions and to disclose the potential impacts of the Federal action on the human and natural environment. For this DRMP/DEIS, the Federal action is the BLM's selection of an alternative, which will serve as the framework for future land use planning direction and for the appropriate use of the public lands that comprise the Monument. The human environment is considered to include both the natural environment (resources) and the BLM multiple-use land management environment (resource uses).

The potential consequences or impacts of each alternative are addressed in the same order of resource topics as was presented in Chapter 3 (e.g., Resources, Resource Uses, Special Designations, and Social and Economic Conditions). This parallel organization will allow readers to compare existing resource conditions (Chapter 3) to potential impacts (Chapter 4) for the same resource(s). The impacts analysis of environmental consequences emphasizes key planning issues (see Chapter 1) raised during the scoping process, rather than all possible consequences.

Potential impacts for a particular resource or resource use are discussed primarily in terms of the direct physical change and the indirect consequences of change resulting from the specific management of that resource or resource use under a particular alternative, followed by those impacts from other management *on* that specific resource or resource use, in turn, resulting from:

- the management of cultural resources;
- the anticipated level of oil and gas development;
- the management of rangeland resources;
- the management of recreation and/or transportation; and,
- the management of other resources that may impact the particular resource or resource use under discussion.

The two exceptions to this organization occur in the discussion of Air Quality (Section 4.2.1) and Social and Economic Conditions (Section 4.4.). In the case of Air Quality, the impact analysis model for oil and gas development, was run in terms of the highest level of potential air quality impacts of the action alternatives (although not at "worst-case" scenario levels). Therefore one analysis covers Alternatives II through V and is based on the alternative with the most development (Alternative IV). Impacts from the other oil and gas development scenarios discussed in the other action alternatives are assumed to be potentially less than those modeled for Alternative IV.

As discussed in Chapter 2, it is important to remember that this planning process is somewhat more constrained, in terms of the range of alternatives, than many other BLM land-use planning environmental analyses. This is due to the management of the planning area as a National Monument and to the specific requirements of the Proclamation that designated it as a National Monument. It is also important to note that the actions described under each alternative would not necessarily be permitted by the adoption of any alternative as a result of the planning process. For example, although new oil and gas leasing may be allowed under some of the alternatives, actual development would only occur after an area has been leased, and/or after any proposed well locations, road and/or pipeline alignments, and/or other

facilities/infrastructure have gone through a permitting process. Furthermore, while the assumptions associated with the alternatives represent reasonable projections of what could occur, it is impossible to predict with certainty the precise location of potential development or structure, or the precise outcome of any of the alternatives, due to the large number of variables involved.

The actions analyzed in this chapter include both the proposed land-use planning actions for a variety of resources and resource uses, as well as the proposed implementation decisions regarding travel management.

4.1. Impact Analysis Methods and Assumptions

4.1.1. Analysis of Alternatives

The analysis of alternatives describes how each alternative could affect baseline conditions of individual resources in the planning area. Impacts typically are described by topic, such as surface disturbance, and other resources or resource uses. If a particular allowable use or management action is not discussed for a particular resource, it is because no impacts are expected or the anticipated impact is not considered significant.

4.1.2. Impact Analysis

When applicable, definitions of the following types of impacts are included in the evaluation of environmental consequences (all possible impacts are not described and, unless otherwise stated, impacts described in this chapter are assumed adverse), including:

- **Direct/Indirect Impacts:** In general, direct impacts result from activities authorized by the BLM and generally occur at the same time and place as the management activity or action causing the impact. For example, for the action of building a road, a direct adverse impact is surface disturbance. Surface disturbance is the impact (the effect) of heavy equipment (the cause) removing existing vegetation as it grades the proposed road location. Indirect impacts often occur at some distance or time from the action. In the above example, an indirect impact could occur days after the surface is disturbed, as well as some distance from the disturbance. Heavy precipitation following the removal of vegetation and/or disturbance of the ground surface could erode soil and transport sediment into streams. The impact on stream-water quality is considered an indirect adverse impact.
- **Onsite/Offsite Impacts:** Onsite impacts occur within the Monument. Offsite impacts occur outside the Monument, but result from an action taken within the Monument. The degree to which land uses, management actions, and environmental changes under the alternatives would affect other lands depends on the absolute and relative amount of onsite changes, the causal linkage between onsite changes and offsite consequences, and the relationship between changes resulting from the alternative and those that would occur without the alternative.
- **Short- or Long-Term Impacts:** When applicable, the short-term or long-term aspects of impacts are described. For purposes of this DRMP/DEIS, short-term impacts occur during or after the activity or action and may continue for up to 2 years. Long-term impacts occur beyond the first 2 years. Five years is an approximation of the time required to restore or reclaim an area following surface disturbance.
- **Cumulative Impacts:** Cumulative impacts result from the interaction of impacts of the alternative along with impacts resulting independently from unrelated actions and activities. Cumulative impacts may include private lands within the Monument, as well

as both private and public lands outside the Monument. Additionally, cumulative impacts are not necessarily limited to the types of actions and activities affecting BLM lands in the Monument.

Quantification of cumulative impacts is difficult for the resources, land uses, and management actions due to:

- uncertainties regarding the location, scale, and/or rate of changes on BLM lands in the Monument resulting from the alternatives;
- uncertainties about the location, scale, and rate of changes on private lands adjacent to, or near, the Monument that would occur irrespective of the alternative; and
- uncertainties about the location, scale, and rate of changes resulting from the general human population growth of the county.

All of the environmental impacts associated with the implementation of any of the alternatives would be in addition to ongoing existing impacts occurring on Federal lands in the Monument, private lands within the Monument, and both public and private lands adjacent to, or near, the Monument. Even where an estimate of cumulative impacts resulting from offsite causes is available (e.g., the number of oil and gas wells in Montezuma County in 20 years), it is not known how much long-term surface disturbance would result; to what degree adverse impacts would be avoided or mitigated; or how the impacts would affect other resource values and land uses, such as hunting, off-road travel, visual quality, livestock grazing, and so forth. Therefore, the descriptions of cumulative impacts for the individual resources addressed in Sections 4.2 through 4.4 are necessarily qualitative.

Also germane to the discussion of cumulative impacts are the boundaries used to define impact sources and levels. These differ by resource. For example:

- for wide-ranging wildlife, such as deer and elk, the cumulative impact area may include offsite habitats that are used to some extent by onsite populations and that are subject to impacts from development in the offsite areas;
- for air quality, the cumulative impact area may be an entire air shed, including all emission sources that affect the same air quality parameters potentially impacted by the implemented alternative;
- for surface water quality, the cumulative impact area may be one or more watersheds, including all pollutant sources that affect the same water quality parameters potentially impacted by the implemented alternative; and
- for socioeconomics, the cumulative impact area may be one or more towns or counties, including all sources of beneficial and adverse impacts on tax revenues, employment, housing, and/or quality of life considerations reasonably (i.e., not too remotely) affected by changes related to the implemented alternative.

Although these are only examples, they illustrate that cumulative impact boundaries may not only differ considerably among resources, but that the boundaries may be either natural or artificial.

Beyond the 20-year planning horizon, the BLM believes that quantitative impact assessments are speculative and unreliable, and hence, inappropriate. This is due to a large number of economic, geopolitical, environmental, regulatory, technological, and/or other factors that could affect conditions in the Monument beyond 20 years, and are themselves subject to change in unexpected ways or degrees. In general, however, it can reasonably be assumed that the Monument would continue to support existing multiple uses beyond the 20-year timeframe.

4.1.3. Methods and Assumptions

Due to the programmatic and strategic nature of this DRMP/DEIS, the timing and specific location of project-specific actions that could impact resource values are not defined. Moreover, the relationship between cause (future actions) and effect (impact on resources) is not always known or quantifiable. For these reasons, the analysis of alternatives is both qualitative and quantitative and is based on a series of assumptions. The methods and assumptions listed below, and for each resource in the following sections, are disclosed to provide a basis for the conclusions reached. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources and resource uses are listed under the appropriate resource section.

- All alternatives are implemented in compliance with standard practices, best management practices (BMPs), guidelines for surface-disturbing activities, and applicable laws, standards, policies, and implementation plans, as well as with all BLM polices and regulations.
- An oil and gas lease grants the lessee the “right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits” in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). The Secretary of the Interior has the authority and responsibility to protect the environment within Federal oil and gas leases; therefore, restrictions are imposed on the lease terms.
- Provisions in leases that expressly provide the BLM the authority to deny or restrict development, in whole or in part, depend on an opinion provided by the U.S. Fish and Wildlife Service (USFWS) regarding impacts to endangered or threatened species or to habitats of plants and animals that are listed or proposed for listing. If the USFWS concludes that the development likely would jeopardize the continued existence of any endangered or threatened plant or animal species, then the development may be denied in whole or in part.
- Although not defined as a surface-disturbing activity, concentrated livestock and wild ungulate grazing, off-road vehicle use, and fire may remove vegetation and expose the soil surface leading to increased erosion.
- Comparison of impacts among resources is intended to provide an impartial assessment to inform the decision maker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources.
- Key planning issues identified in Chapter 1 provide the focus for the scope of impact analyses in this chapter.
- In general, adverse impacts described in this chapter are considered important if they result from, or relate to:
 - the key planning issues described in Chapter 1;
 - the context and/or intensity of impacts suggest potential impacts to public health and safety;
 - a potential for violating legal standards, laws, and/or protective status of resources; and/or,
 - potential impacts to unique resources.

- The comparison of individual alternatives is qualitative, relative to Alternative I (the No Action Alternative), and based on professional judgment and consideration of the context and intensity of allowable uses and management actions anticipated to impact resources and resource uses.
- Analysis of environmental consequences considered the extent of projected surface disturbance and associated development from BLM actions.
- Analysis of environmental consequences focuses on the anticipated incremental and meaningful impact of management actions and the allowable uses proposed for each alternative. The impact of past and present actions is encompassed within the description of existing conditions in Chapter 3, Affected Environment.

4.1.4. General Levels of Impacts

In an attempt to reduce the necessarily complex impact analysis process to readily understandable terms, the following subsections use a qualitative approach for summarizing impacts to specific resources, management actions, and uses. For some resources the impacts are defined more quantitatively, while others remain as general levels of impact. In terms of duration, impacts may be short-term (less than 2 years) or long-term (greater than 2 years).

4.1.5. Impact Analysis Components

The starting point for analysis of the alternatives is the Analysis of the Management Situation (AMS) (BLM 2005b) and the RFD (BLM 2005c) for oil and gas development in the Monument. The AMS describes the current management activities in the Monument, the physical environment, and the regulatory requirements. The RFD is intended as a technical and scientific approximation of anticipated levels of oil and gas development that could potentially take place during the planning timeframe. As such, neither the RFD, nor the planning process of which it is a part, are intended to define the specific numbers and locations of wells and pads needed to develop the oil and gas resource. Instead, they are intended to allow flexibility during resource development while, at the same time, providing sufficient specificity to support the impact analysis and the alternative selection processes.

Table 4-1 summarizes the quantifiable components of resource management actions that are used for all of the impact analyses.

Table 4-1 Impact Analysis Components					
Resource	Alternative I (No Action)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred)
165,000 acres and 256 square miles of Monument area					
Cultural Resources					
Sites Stabilized and/or Developed	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Site Stabilization	Stabilize up to 240.	Document and allow standing walls to deteriorate.	Document and allow standing walls to deteriorate.	Stabilize and preserve standing walls.	Document standing walls and allow to deteriorate; stabilization authorized under discretion of Monument Manager.
Protection Methods	Apply National Historic Preservation Act (NHPA) Section 106.	Apply NHPA Section 106 to communities, sites, and isolated finds.	Apply NHPA Section 106 to communities and sites.	Apply NHPA Section 106 to communities and sites.	Apply NHPA Section 106 to communities and sites.
Fire Management Zones (FMZs)					
Fuels and Fire	Manage Monument as combination of FMZs A, B, and C. Manage 157,258 acres (95%) with no specific fire suppression requirements. Manage 7,983 acres (5%) with specific fire suppression requirements.	Manage entire Monument (165,000 acres) as FMZ B, with specific fire suppression requirements.	Manage entire Monument (165,000 acres) as FMZ B, with specific fire suppression requirements.	Manage entire Monument (165,000 acres) as FMZ B, with specific fire suppression requirements.	Manage entire Monument (165,000 acres) as FMZ B, with specific fire suppression requirements.

Table 4-1 Impact Analysis Components

Resource	Alternative I (No Action)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred)
Soil/Water					
Soil Resources	Apply Site-Specific Relocation (SSR)/Controlled Surface Use (CSU) stipulations to protect slopes greater than 40 % (21,036 acres).	Apply No Ground Disturbance (NGD)/No Surface Occupancy (NSO) stipulations to protect slopes greater than 30% (36,504 acres).	Apply NGD/NSO stipulations to protect slopes greater than 30% (36,504 acres).	Apply NGD/NSO stipulations to protect slopes greater than 30% (36,504 acres).	Apply NGD/NSO stipulations to protect slopes greater than 30% (36,504 acres).
Riparian Protection	Manage 2,415 riparian acres.	Apply NGD/NSO stipulations to protect canyon bottoms, riparian, floodplain areas (5,312 acres).	Apply NGD/NSO stipulations to protect canyon bottoms, riparian, floodplain areas (5,312 acres).	Apply NGD/NSO stipulations to protect riparian, floodplain areas (3,217 acres).	Apply NGD/NSO stipulations to protect canyon bottoms, riparian, floodplain areas (5,312 acres).
Water Development	Apply no restrictions on groundwater and/or new water developments.	Discourage groundwater and/or new water development.	Allow groundwater and/or new water development.	Encourage groundwater and/or new water developments to support expanded resource development.	Discourage groundwater and/or new water development.
Fluid Minerals^a					
Number of acres available for lease	No new acres available for lease.	Lease up to 880 acres.	Lease up to 3,021 acres.	Lease up to 24,462 acres.	Lease up to 880 acres.
New well pads on new leased lands	Permit no new well pads.	Permit up to 2 new well pads.	Permit up to 8 new well pads.	Permit up to 59 new well pads.	Permit up to 2 new well pads.

Table 4-1 Impact Analysis Components

Resource	Alternative I (No Action)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred)
New roads on new leased lands	Allow no new roads.	Allow up to 1 mile of new roads.	Allow up to 3 miles of new roads.	Allow up to 19 miles of new roads.	Allow up to 1 mile of new roads.
Total Disturbance on new leased lands	Allow no new disturbance.	Allow up to 18 acres of disturbance on new leased lands.	Allow up to 73 acres of disturbance on new leased lands.	Allow up to 447 acres of disturbance on new leased lands.	Allow up to 18 acres of disturbance on new leased lands.
Rangeland					
Animal Unit Months (AUMs) (Active Preference)	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs
Allotments	Manage 28 allotments.	Manage 23 allotments.	Manage 23 allotments.	Manage 28 allotments.	Manage 23 allotments.
Recreation					
Promotion Strategy, Facility Development, Visitation Management	Promote no specific recreation strategy. Allow facility development, as needed. Maintain developed recreation sites at Lowry, Painted Hand, and Sand Canyon Pueblos for interpretation.	Promote undeveloped strategy with minimum facilities for local visitors. Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry use.	Promote destination strategy with appropriate support facilities for regional visitors. Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry use.	Promote destination strategy with more facilities for national and international visitors. Approximately 47,056 acres for public visitation. Manage 118,279 acres for backcountry use.	Promote a combination of strategies, including undeveloped with minimal facilities for local visitors, as well as destination strategy with support facilities for regional, national and international visitors. Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry

Table 4-1 Impact Analysis Components

Resource	Alternative I (No Action)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred)
Special Recreation Permits (SRPs)	Allow no new commercial SRPs.	Allow no new SRPs. Allow no renewal of existing SRPs.	Allow no new SRPs. Allow renewal of existing SRPs.	Allow new SRPs on a case-by-case basis.	Allow up to 10 SRPs. use.
Transportation^b					
Total Road Miles (acres) (motorized, nonmotorized, plus new minerals)	Manage 149 total road miles (with 864 acres of disturbance).	Manage 139 total road miles (with 806 acres of disturbance).	Manage 189 total road miles (with 1,096 acres of disturbance).	Manage 213 total road miles (with 1,235 acres of disturbance).	Manage 169 total road miles (with 980 acres of disturbance).
Road Density (includes new mineral roads)	Allow road density of 0.58 miles/square mile.	Allow road density of 0.54 miles/square mile.	Allow road density of 0.73 miles/square mile.	Allow road density of 0.83 miles/square mile.	Allow road density of 0.66 miles/square mile.
Off-Highway Vehicle (OHV) Management	Manage 25,976 acres as closed. Manage 139,359 for limited OHV use.	Manage 38,598 acres as closed. Manage 126,737 for limited OHV use.	Manage 25,976 acres as closed. Manage 139,359 for limited OHV use.	Manage 25,976 acres as closed. Manage 139,359 managed for limited OHV use.	Manage 38,598 acres as closed. Manage 126,737 for limited OHV use.
Number of Support Facilities	Allow 7 support facilities.	Allow 7 support facilities.	Allow 13 support facilities.	Allow 20 support facilities.	Allow 11 support facilities.
Special Designations					
Special Designation Areas	Manage 25,549 acres as Wilderness Study Areas (WSAs), Make no Wild and Scenic Rivers (WSR) designations. Manage 427 acres as	Manage 25,549 acres as WSA, plus 5,223 acres for wilderness character. Consider all eligible river segments suitable as WSR	Manage 25,549 acres as WSA. Consider no river segments suitable as WSR. Manage 427 acres as RNA. Manage 427 acres as ACEC.	Manage 25,549 acres as WSA. Consider no river segments suitable as WSR. Manage 427 acres as RNA. Manage 427 acres as ACEC.	Manage 25,549 acres as WSA, plus 5,223 acres for wilderness character. Consider no river segments suitable as WSR. Manage 7,826 acres

Table 4-1 Impact Analysis Components

Resource	Alternative I (No Action)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred)
	Resource Natural Area (RNA). Manage 165,335 as ACEC.	(25.3 miles). Manage 7,826 acres as RNA. Manage 7,826 as ACEC.			as RNA. Manage 7,826 acres as ACEC.

^a Figures are for new-leased lands only.

Figures for existing leased lands are as follows:

- number well pads - 121
- miles of road - 67
- number of treatment facilities - 8
- miles of pipeline - 53

^b Total acres of disturbance - 883 gross, 428 net (includes abandoned & reclaimed acres)

It was estimated that for every mile of road, approximately 5.8 acres of ground are disturbed, using the average for local roads, which is a 24' road crown width and 48' disturbance width (BLM 9113 Roads Manual, 1985).

4.1.5.1. Protective Stipulations and Other Restrictions on Surface Use

The RFD does not incorporate all of the land management direction and multiple-use considerations that the BLM must take into account as part of its responsibilities under the Federal Land Policy and Management Act (FLPMA). Therefore, in developing the alternatives, assumptions in the RFD were subjected to various “screens” or “filters” representing restrictions designed to protect specific resource values and meet the BLM’s multiple-use and sustainability mandates. Protection of specific resources is accomplished by a combination of management actions and the surface-use stipulations described in Section 2.2. These include:

- **Site-Specific Relocation (SSR):** Under this restriction, the BLM may require special restrictions, including shifting a ground-disturbing activity by more than 200 meters from the proposed location to another location, to protect a specific resource. In oil and gas leases, this stipulation is termed Controlled Surface Use (CSU).
- **No Ground Disturbance (NGD):** Under this restriction the BLM would not allow long-term ground-disturbing activities (i.e., with an impact that would last longer than 2 years). For oil and gas leases, this stipulation is termed No Surface Occupancy (NSO). In regard to certain cultural or biological resources, the inability to have no impacts beyond 2 years negates the activity from being implemented altogether.
- **Timing Limitation (TL):** Under this restriction, the BLM may allow specified activities within the area, and/or at a proposed location, but not during certain sensitive seasons (e.g., in raptor nesting areas, bald eagle winter roosting areas, big game winter range). It is important to note that TL restrictions can apply to NGD/NSO and SSR/CSU areas, as well as to areas with standard restrictions and limitations.

On split-estate lands (i.e., Federal minerals but private surface), the NGD/NSO, SSR/CSU, and TL stipulations would only be applied in relation to mineral exploration and development, such as with drilling for oil and gas. This is because the BLM may regulate aspects of these activities that occur on the surface as well as in the subsurface. The BLM does not regulate or manage other types of activities on split-estate lands (e.g., grazing, recreation, utilities rights-of-ways, etc.).

In addition to the restrictions and limitations on surface uses and management activities outlined above, the BLM would require best management practices (BMPs) (see Appendix E).

Examples include the required use of:

- culverts at stream crossings;
- special road design and/or dust suppression techniques designed to reduce impacts from aerial deposition of particulates on nearby streams and vegetation;
- biodegradable erosion-control fabrics designed to ensure soil stability and enhance revegetation;
- fences designed to exclude livestock from sensitive habitats; and
- specialized revegetation that uses only native species and possibly requires woody plants (trees and shrubs) to be included in the seed mix and/or planted as containerized stock (“tubelings”).

These measures, as well as the protective restrictions cited above, would be applied not just to oil and gas development and grazing, but also, as appropriate, to recreation, aquatic and riparian habitat enhancements, forest management activities (including timber harvesting and

prescribed fires), and construction and/or routine maintenance in rights-of-way (ROWs) and easements.

4.2. Resources and Resource Uses

The following impact analysis includes evaluation of all resources and resource uses. Cultural resources, fluid minerals, rangeland, recreation, and transportation are the resources or resource uses that would have the most impact in the Monument; therefore, each is discussed in relation to each resource or resource use, as well as for each alternative. This arrangement may result in some repetition where management actions are similar for all alternatives; however, it allows the reader to better understand the impact of significant management actions across all resources and resource uses in the Monument. A summary of impacts is also provided for each resource or resource use. Each resource is discussed in the same order as it is presented in Chapter 3, Affected Environment.

4.2.1. Air Quality

The primary goal of air quality management is to protect air quality within, and outside of, the Monument. The management objectives related to this goal are to:

- ensure that the air quality within the Monument meets State and Federal air quality standards and regulations;
- protect visibility at scenic and important vistas located within the Monument; and
- cooperate with the State of Colorado, the NPS, and the USFS regarding air quality issues at nearby Federal Class I (Clean Air Act) areas (Mesa Verde National Park and Weminuche Wilderness).

Under the FLPMA and the Clean Air Act, the BLM cannot conduct or authorize any activity that does not conform to all applicable Federal, Native American Tribal, State, and local air quality laws, statutes, regulations, standards, policies, and implementation plans. Therefore, an extensive air quality impact assessment, based on atmospheric dispersion modeling, was conducted to analyze the potential impacts of the action alternatives. In comparison to oil and gas drilling and production (including CO₂), other management actions considered throughout this analysis are expected to have extremely minor impacts. The modeled impacts, therefore, incorporate parameters for the maximum estimated oil and gas development (Alternative IV) over the 20-year planning period, as characterized in the RFD (BLM 2005c).

Atmospheric dispersion models, including the one used for this environmental analysis, are computer programs designed to simulate how pollutants in the ambient atmosphere disperse and, in some cases, how they react in the atmosphere. The dispersion models are used to estimate or to predict the downwind concentration of air pollutants emitted that can impact ambient air quality. The dispersion models require the input of data that includes:

- meteorological conditions, such as wind speed and direction; the amount of atmospheric turbulence; the ambient air temperature; and the height to the bottom of any inversion aloft that may be present;
- emissions parameters, such as source location and height, source vent stack diameter and exit velocity, exit temperature, and mass-flow rate;
- terrain elevations at the source location and at the receptor location; and
- location, height, and width of any obstructions (such as buildings or other structures) in the path of the emitted gaseous plume.

AERMOD, the EPA-approved atmospheric dispersion model used in this analysis, is an integrated system that includes three modules:

- a steady-state dispersion model designed for short-range (up to 50-kilometers) dispersion of air pollutant emissions from stationary industrial sources;
- a meteorological data preprocessor (AERMET) that accepts surface meteorological data, upper air soundings and, optionally, data from onsite instrument towers (which then calculates atmospheric parameters needed by the dispersion model, such as atmospheric turbulence characteristics, mixing heights, friction velocity, etc.); and
- a terrain preprocessor (AERMAP) whose main purpose is to provide a physical relationship between terrain features and the behavior of air pollution plumes (which generates location height data for each receptor location and provides information that allows the dispersion model to stimulate the effects of air flowing over hills or splitting to flow around hills).

This analysis compares potential air quality impacts from Alternative IV to applicable air quality standards, prevention of significant deterioration (PSD) increments, significant impact levels (SILs), and air quality related values (AQRVs). However, it does not represent a regulatory air quality permit analysis. Comparisons to the PSD Class I and Class II increments are intended to evaluate a “threshold of concern” for potentially significant direct project impacts, but do not represent a cumulative regulatory PSD Increment Consumption Analysis. Such a regulatory PSD increment analysis is the responsibility of the State air quality agency (under EPA oversight), and would be conducted during the permitting process.

AERMOD was used to evaluate both direct project and cumulative Class I increment impacts and deposition AQRV analyses at Mesa Verde National Park (the closest Class I area). VISCSCREEN (a model that calculates the impact of specified emissions for specific transport and dispersion conditions) was used to evaluate visibility impacts. This air quality analysis is completely described in Appendix J, including all accepted criteria and parameters, complete methods, and results.

All dispersion models, regardless of their level of complexity, are mathematical approximations of the behavior of the atmosphere. Therefore, especially given the uncertain nature of the number and potential location of sources under the analyzed alternatives, the results need to be appropriately viewed as estimates of possible future concentrations and not as exact predictions in time and space.

Dispersion modeling is generally conducted using assumptions that ensure that the modeled results do not underestimate actual future impacts so that appropriate planning decisions can be made. For example, sources may be assumed to operate for longer periods or emit more pollutants than actual conditions to ensure that health-based standards are protected. On the other hand, analyses are not conducted assuming “worst-case” conditions across the board, because this typically leads to results that are unreasonable and unrealistic. Hence, dispersion modeling uses the best available information and methods (EPA-approved models, emission factors, etc.) when possible, combined with the best scientific and professional judgment in an attempt to ensure that projections of future air quality are neither under-predicted nor unrealistically over-predicted.

4.2.1.1. Evaluation Criteria and Assumptions

Potential air quality impacts were analyzed to determine maximum “near-field” (local or Class II) ambient air pollutant concentrations and hazardous air pollutant impacts, as well as to determine maximum “far-field” (regional or Class I) impacts on ambient air pollutant

concentrations, visibility, and atmospheric deposition of sulfur and nitrogen (“acid rain” constituents). This section describes the results for modeling of near-field and far-field air quality in the Monument based on the maximum expected oil and gas development during the 20-year period of analysis.

Near-field and far-field air quality parameters, grouped by Class I and Class II analyses, were inventoried and analyzed and are described below.

Near-Field (Class II)

- Criteria Pollutant Emissions (National Ambient Air Quality Standard (NAAQS) and PSD increments): NO_x (including NO₂), CO, SO₂, PM₁₀, and PM_{2.5}
- Hazardous Air Pollutants (HAPs): formaldehyde

Far-Field (Class I)

- Emissions of Criteria Pollutants (NAAQS and PSD increments): NO_x (including NO₂), CO, SO₂, PM₁₀, and PM_{2.5}
- Visibility
- Sulfur and nitrogen deposition

For this analysis, it is assumed that all fluid mineral companies operating in the Monument are in compliance with current standards. (Some fluid mineral operations have been in existence for a long time; therefore, out-of-date equipment may not meet current standards. Monument staff continue to work with companies to bring them into compliance, which is an administrative issue outside the scope of this DRMP/DEIS.)

For this DRMP/DEIS, two inventories of air emissions were developed. The project inventory considered foreseeable oil, natural gas, and CO₂ development activities in the Monument, and includes air emissions from both construction and production operations. The cumulative inventory considered emissions from other existing sources and reasonably foreseeable future sources within the study area that are not already represented in the background air quality and AQRV data (i.e., sources that were not in operation as of the end date of the monitoring data, which was December 2004). The cumulative inventory area has been defined as the region within 50 km (31 miles) from the center of the Monument (approximate Universal Transverse Mercator [UTM] coordinates of 685 km E and 4145 km N, Zone 12, NAD83).

The cumulative inventory also addressed existing production emission sources in the Monument. The maximum historical natural gas compression capacity in the Monument is known to be approximately 1,000 hp; therefore, emissions for three 350-hp compressors were modeled to conservatively represent existing natural gas production (along with one new 350-hp compressor to represent increased project natural gas production). The estimated project oil production rates are five times greater than current oil production rates and equal to the historical maximum annual production rates for the Monument. In addition, many of the new oil wells would replace exhausted wells that cease production during the 20-year period. Therefore, the project oil production emissions (including fugitive emissions from oil haul trucks and well servicing) effectively include existing oil production emissions. Finally, because existing CO₂ compression is electrical (i.e., with power provided by the utility grid), there are no significant existing CO₂ production emissions.

The cumulative discussion of results concludes with a consideration of the role of this proposed development scenario in the context of global warming.

4.2.1.2. Alternative Analysis

Air quality impacts under the action alternatives (Alternatives II through V) are discussed together, rather than separately, because the evaluation was based on the alternative with the most potential development (Alternative IV). Impacts from the other oil and gas development scenarios, represented by the other action alternatives, are assumed to be less than those modeled for Alternative IV.

Alternative I (No Action Alternative)

Under Alternative I (the No Action Alternative), the existing air quality conditions described in Section 3.1.1, would continue, with regard to impacts to air quality, based on continuing current management.

Action Alternatives

The following discussion summarizes air quality modeling results for maximum assumed oil and gas development (Alternative IV). Modeled direct and cumulative impacts are added to these background concentration values. The air quality impacts from the project and offsite cumulative impacts were compared to EPA Class I and II Area SILs, PSD Class II increments, and State of Colorado AAQs and NAAQs.

The nearest Class I area to the Monument is Mesa Verde National Park, which is located approximately 40 km (25 miles) east of the locations in the Monument where development may occur. The next closest Class I area is the Weminuche Wilderness Area, which is located approximately 112 km (70 miles) from the Monument. Given the close proximity of Mesa Verde National Park, versus the other Class I areas, it is highly likely that the Class I impacts of the project will be the greatest at Mesa Verde National Park. Therefore, the Class I analyses was only performed for Mesa Verde National Park.

Criteria Pollutants: Assessment of Class II Air Quality Impacts

Table 4-2 summarizes air quality standards and increments, SILs and AQRV criteria against which modeled results are compared. A summary of total project emissions, which includes construction and production direct and indirect emissions for CO₂ development and oil and gas development, is presented below in Table 4-3.

The air quality analyses compare the predicted direct project and cumulative air impacts to the Class II SILs, PSD Class II increments, and to State AAQs and NAAQs.

The EPA and the State of Colorado have established SILs in order to define a *de minimus* impact level that is considered “insignificant” and that does not warrant further review. Under the PSD review process, a project that demonstrates, via modeling, that project-only emissions result in impacts that are less than the established SILs is exempt from additional modeling analyses for that pollutant. For this NEPA air quality analysis, the PSD review criteria are not directly applicable. However, the direct project impacts are compared to the Class II SILs in Table 4-4 in order to evaluate the relative magnitude of the impacts. The NO₂, PM₁₀, and SO₂ impacts are greater than the Class II SILs.

The direct project impacts (excluding temporary construction sources) were also evaluated in comparison to the Class II PSD increments, and these results are presented in Table 4-5. This increment analysis is for information purposes only, and does not represent a cumulative regulatory PSD Increment Consumption Analysis. Such a regulatory PSD increment analysis is the responsibility of the State air quality agency (under EPA oversight) and would be conducted during the permitting process. The impacts are all less than the Class II PSD increments.

Finally, the model-predicted direct project and cumulative impacts were added to the background data and then compared to the NAAQSs in Table 4-6. The impacts are all less than the applicable NAAQSs.

Hazardous Air Pollutant (HAP) Analysis Result

The HAP analysis evaluated the formaldehyde direct project impacts for both short-term (acute) and long-term (chronic) exposure assessment, as well as evaluated formaldehyde cancer risks.

Formaldehyde emissions for both the construction and production phases were modeled. The modeling methodology used the same near-field source layout and receptor configuration previously described in Section 3.4. The maximum modeled hourly formaldehyde concentration was 16.9 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), and the maximum annual average concentration was 0.116 $\mu\text{g}/\text{m}^3$.

The short-term analysis evaluated modeled impacts against the EPA Acute Exposure Guideline Level (AEGL) Level-1, 1-hour concentration threshold for formaldehyde of 0.90 ppm, which is equivalent to 1,107 $\mu\text{g}/\text{m}^3$. The maximum modeled 1-hour concentration is 1.5 percent of the AEGL concentration.

The long-term analysis evaluated modeled annual impacts against a chronic threshold of concern. The EPA has not established a long-term reference concentration (or proper functioning condition [PFC]) for formaldehyde. However, the Agency for Toxic Substances and Disease Registry (ATSDR) has established a chronic inhalation minimal risk level (MRL) of 0.003 ppm, which is equivalent to 3.7 $\mu\text{g}/\text{m}^3$ (ATSDR 1997). The MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health impacts over a specified duration of exposure. The maximum modeled annual concentration is 3.1 percent of the MRL concentration.

The incremental risk analysis considered exposure over a 70-year lifetime, using EPA's unit risk factor (ATSDR 1997b) for formaldehyde (1.3×10^{-5}). The most likely exposure (MLE) scenario was considered. The duration of exposure for the MLE scenario is assumed to be 50 years, in order to represent the project (well field) lifetime, corresponding to an exposure adjustment factor of $50/70 = 0.71$. A second adjustment can be made for time spent at home, versus time spent elsewhere; however, the MLE scenario assumes that the individual is at home 100 percent of the time, for a final MLE adjustment factor of $(0.71 \times 1.0) = 0.71$. To calculate the excess cancer risk, the maximum annual predicted formaldehyde concentration was multiplied by the adjustment factors, and then multiplied by the unit risk factor. The resulting estimated cancer risk is 1.07×10^{-6} , which is at the very low end of the generally accepted cancer risk range of 1×10^{-6} to 100×10^{-6} as presented in the "Superfund" National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300).

Criteria Pollutants: Assessment of Class I Air Quality Impacts

The Class I air quality impact analyses compare the predicted direct and cumulative air impacts of the project to the Class I SILs, PSD Class I increments, and AQRV threshold values.

The EPA and the State of Colorado have established Class I SILs in order to define a *de minimus* impact level for Class I areas that is considered "insignificant" and that does not warrant further review under the PSD permitting process. For this NEPA air quality analysis, the PSD review criteria are not directly applicable. However, the direct project impacts are compared to the Class I SILs in Table 4-7 in order to evaluate the relative magnitude of the impacts. The 24-hr PM_{10} , 3-hr SO_2 , and annual NO_2 impacts are greater than the Class I SILs.

Table 4-2 Air Quality Standards, Increments, Significant Impact Levels (SILs), and Air Quality Related Value (AQRV) Criteria							
Pollutant	Averaging Interval	EPA Class II SIL (µg/m ³)	NAAQS (µg/m ³)	Class II PSD Increment (µg/m ³)	EPA Proposed Class I SIL (µg/m ³)	Class I PSD Increment (µg/m ³)	AQRV Threshold
NO ₂	Annual	1	100	25	0.1	2.5	-
SO ₂	3-hour	25	1300	512	1.0	25	-
	24-hour Annual	5 1	365 80	91 20	0.2 0.1	5 2	- -
PM ₁₀	24-hour Annual	5 1	150 50	30 17	0.3 0.2	10 5	- -
	24-hour Annual	- -	65 15	- -	- -	- -	- -
CO	1-hour	2,000	40,000	-	-	-	-
	8-hour	500	10,000	-	-	-	-
Ozone	8-hour	100 tpy VOC	0.08 ppm	-	-	-	-
Lead	Quarterly	0.1	1.5	-	-	-	-
Visibility (deciviews)	24-hour	-	-	-	-	-	1.0
Nitrogen Deposition (kg/ha-yr)	Annual	-	-	-	-	-	3.0
Sulfur Deposition (kg/ha-yr)	Annual	-	-	-	-	-	5.0

The State of Colorado has also established a 3-hour SO₂ ambient air quality standard of 700 µg/m³, as well as a program similar to the Federal PSD increments limiting additional amounts of SO₂ above baseline conditions. The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Guideline (FLAG 2000) has established visibility AQRV thresholds. The FLAG "just noticeable change" 1.0-deciview threshold is used to assess the significance of potential visibility impacts. U.S. Department of Agriculture, U.S. Forest Service (USDA/USFS) has established cumulative deposition impact thresholds of concern (Fox et al. 1989).

Table 4-3 Summary of Project Emissions

Project Maximum Annual Emissions			
Constituent	Construction Emissions (tpy)	Production Emissions (tpy)	Total Emissions (tpy)
NO _x	215.3	144.7	360.0
CO	48.7	183.9	232.6
SO ₂	14.5	0.2	14.7
PM ₁₀	41.8	55.0	96.8
PM _{2.5}	18.7	9.3	28.0
VOC	22.4	1671.9	1694.3
Formaldehyde	7.9	2.4	10.3

Table 4-4 Comparison of Direct Project Impacts to Class II Significant Impact Levels (SILs)

Pollutant (Averaging Interval)	Project Near-Field Maximum (µg/m ³)	Project Mid-Field Maximum (µg/m ³)	Class II SIL (µg/m ³)	Greater than SIL?
CO (1-hour)	357	802	2000	No
CO (8-hour)	184	147	500	No
NO _x (Annual)	20.5	3.7	1	Yes
PM ₁₀ (24-hour)	70.6	28.3	5	Yes
PM ₁₀ (Annual)	12.6	3.9	1	Yes
SO ₂ (3-hour)	94.5	12.5	5	Yes
SO ₂ (24-hour)	26.9	2.7	25	Yes
SO ₂ (Annual)	3.6	0.2	1	Yes

Table 4-5 Comparison of Project and Cumulative Impacts to Class II PSD Increments

Pollutant (Averaging Interval)	Project Near-Field Maximum (µg/m ³)	Project Mid-Field Maximum (µg/m ³)	Cumulative Mid-Field Maximum (µg/m ³)	Overall Maximum (µg/m ³)	Class II PSD Increment (µg/m ³)	Percent (%) Increment
NO _x (Annual)	20.0	1.7	4.9	20.0	25	80%
PM ₁₀ (24-hour)	0.47	28.0	29.5	29.5	30	98%
PM ₁₀ (Annual)	0.11	3.6	4.0	4.0	17	23%
SO ₂ (3-hour)	0.078	0.037	11.5	11.5	91	13%
SO ₂ (24-hour)	0.025	0.0051	2.9	2.9	512	1%
SO ₂ (Annual)	0.004	0.0005	0.3	0.3	20	1%

Table 4-6 Comparison of Project and Cumulative Impacts to NAAQS

Pollutant (Averaging Interval)	Project Near-Field Maximum ($\mu\text{g}/\text{m}^3$)	Project Mid-Field Maximum ($\mu\text{g}/\text{m}^3$)	Cumulative Mid-Field Maximum ($\mu\text{g}/\text{m}^3$)	Overall Maximum Impact ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Percent (%) of NAAQS ($\mu\text{g}/\text{m}^3$)
CO (1-hour)	357	802	1613	1612.8	2288	3901.2	40000	10%
CO (8-hour)	184	147	300	300.5	1831	2131.1	10000	21%
NOx (Annual)	20.5	3.7	6.8	20.5	16.9	37.4	100	37%
PM ₁₀ (24-hour)	70.6	28.3	30.1	70.6	64.0	134.6	150	90%
PM ₁₀ (Annual)	12.6	3.9	4.3	12.6	21.0	33.6	50	67%
PM ₂₅ (24-hour)	29.7	5.9	6.7	29.7	22.5	52.2	65	80%
PM ₂₅ (Annual)	4.3	0.8	0.9	4.3	6.9	11.2	15	75%
SO ₂ (3-hour)	94.5	12.5	12.6	94.5	68	162	365	45%
SO ₂ (24-hour)	26.9	2.7	2.9	26.9	21	48	1300	4%
SO ₂ (Annual)	3.6	0.2	0.3	3.6	5	8.8	80	11%

Pollutant (Averaging Interval)	Project Maximum ($\mu\text{g}/\text{m}^3$)	Class I SILs ($\mu\text{g}/\text{m}^3$)	Greater than SIL?
NO _x (Annual)	0.15	0.1	Yes
PM ₁₀ (24-hour)	1.1	0.3	Yes
PM ₁₀ (Annual)	0.1	0.2	No
SO ₂ (3-hour)	0.5	0.2	Yes
SO ₂ (24-hour)	0.1	1.0	No
SO ₂ (Annual)	0.01	0.1	No

The direct project impacts (excluding temporary construction sources) were also evaluated in comparison to the Class I PSD increments, and these results are presented in Table 4-8. This increment analysis is for information purposes only, and does not represent a cumulative regulatory PSD Increment Consumption Analysis. The impacts are all substantially less than the Class I PSD increments.

Pollutant (Averaging Interval)	Project Maximum ($\mu\text{g}/\text{m}^3$)	Cumulative Maximum ($\mu\text{g}/\text{m}^3$)	Overall Maximum ($\mu\text{g}/\text{m}^3$)	Class I PSD Increment ($\mu\text{g}/\text{m}^3$)	Percent (%) Increment
NO _x (Annual)	0.034	0.360	0.360	3	14
PM ₁₀ (24-hour)	1.02	1.020	1.020	10	10
PM ₁₀ (Annual)	0.07	0.162	0.162	5	3
SO ₂ (3-hour)	0.00061	0.967	0.967	5	19
SO ₂ (24-hour)	0.00008	0.126	0.126	25	0.5
SO ₂ (Annual)	0.00001	0.017	0.017	2	0.8

Visibility: Assessment of Class I Air Quality Impacts

Direct and cumulative visibility impacts were determined using VISCREEN Level 1 with a “virtual point source” approach to better account for the geographic separation of emissions. The total project emissions (peak construction plus full production) were input to VISCREEN in order to conservatively assess visibility impacts. Model results indicate that impacts are less than those for the screening criteria. (Refer to Appendix J for complete VISCREEN input and output results for the Monument analysis.)

The cumulative visibility analysis also used VISCREEN in order to assess impacts for other cumulative sources (with distances adjusted, as necessary, in order to account for geographic separation of emission units at each source). The only cumulative source outside of the Monument was a project in the Monticello Field Office (Utah); therefore, that project was modeled using an actual distance of 85 km (53 miles) added to a virtual point source increase in

downwind distance of 80 km (50 miles). These results indicate that impacts are less than the screening criteria (see Appendix J). Conservatively adding the Monument and the Monticello impacts together to estimate cumulative impacts still results in cumulative visibility impacts less than the screening criteria.

Sulfur and Nitrogen Deposition: Assessment of Class I Air Quality Impacts

Direct and cumulative Class I deposition impacts were determined using the Level 1 method described in Section 5.1.3 of the “Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 1 Recommendations” (1993). This method uses the maximum modeled project and cumulative PSD increment concentrations at Mesa Verde National Park, along with the conservative assumption that all SO₂ and NO_x are converted and deposited. Table 4-9 compares deposition impacts to USFS levels of concern, which are defined as 5 kilograms per hectare per year (kg/ha-yr) for sulfur, and 3 kg/ha-yr for nitrogen. All direct project deposition impacts, and the cumulative sulfur deposition impacts, are less than the levels of concern. The cumulative nitrogen deposition impact is greater than the level of concern; however, this is likely the result of the extremely conservative methodology used in this deposition analysis.

Table 4-9 Sulfur and Nitrogen Deposition Impacts				
	Direct Project Sulfur Deposition (µg/m³)	Direct Project Nitrogen Deposition (µg/m³)	Cumulative Sulfur Deposition (µg/m³)	Cumulative Nitrogen Deposition (µg/m³)
SO ₂ PSD Class I Annual Concentration (µg/m ³)	0.00971	NA	0.017	NA
NO ₂ PSD Class I Annual Concentration (µg/m ³)	NA	0.034	NA	0.360
Mole Weight Adjustment Factor	0.5	0.30	0.5	0.30
Number seconds/year (µ)	3.1536E(+07)	3.1536E(+07)	3.1536E(+07)	3.1536E(+07)
Deposition Velocity	0.005	0.05	0.005	0.05
Dry Deposition (kg/ha-yr)	0.05	1.1	0.09	12.1
Effects Threshold (kg/ha-yr)	5.0	3.0	5.0	3.0

Global Climate Change

The assessment of greenhouse gas emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impacts to climate. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that “Warming of the climate system is unequivocal” and that “Most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.”

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to air quality resulting from climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts would occur as a result of increased wind-blown dust from drier and less stable soils. Then cool season plant species’ ranges would be predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants would be potentially accelerated. In addition, due to the loss of habitat, and/or from competition from other species whose ranges shift northward, the

population of some animal species could be reduced. Less snow at lower elevations would then be likely to affect the timing and quantity of snowmelt, which, in turn, may affect aquatic species.

4.2.2. Cultural Resources

The primary goals of cultural resources management in the Monument are to identify, preserve, and protect significant cultural resources to ensure long-term public benefits (i.e., from research, education, and preservation of cultural heritage [FLPMA Sections 103(C), 201 (A), 202 (C); NHPA Sections 106 and 110; the Archaeological Resources Protection Act of 1979, Section 14(a); and the Antiquities Act of 1906 (Section 2)]. The management objectives related to this goal include:

- allocate all cultural resources currently recorded, and/or projected to occur on the basis of existing data synthesis, to uses according to their nature and relative preservation value;
- inventory, document, and evaluate cultural resources to facilitate proper management, protection, and research; and
- cooperate with Hovenweep National Monument on protection and management of cultural resources.

It is also the goal of cultural resources management to ensure that the objects of the Monument are protected at the landscape level, and that all multiple-use resource management and authorizations for land and resource uses are conducted in compliance with Sections 106 and Section 110 of the NHPA, as amended. The management objectives related to this goal include:

- manage and protect cultural resources on a landscape level;
- manage multiple-uses to ensure the protection of cultural resources, in compliance with Section 106 of the NHPA;
- manage cultural resources for protection, preservation, and realization of BLM cultural use allocations (Section 110 of NHPA);
- preserve the existing character of the cultural and physical landscape to the maximum extent possible;
- encourage, foster, and conduct scientific research on cultural resources in the Monument;
- manage all Monument/Anasazi Heritage Center (AHC) collections in compliance with 36 CFR Part 79; U.S. Department of the Interior (USDOI) Departmental Manual, Part 411; and USDOI Museum Property Handbook, 411 DM, Vols. I-II; and
- strive toward responsive and sensitive stewardship and management of traditional cultural heritage values associated with cultural resources and landscapes.

Another goal of cultural resources management is to uphold Native American trust responsibilities and accommodate traditional uses in the Monument. The management objective related to this goal is to develop a policy in consultation with Native American tribes that specifies how the Monument will provide products for traditional cultural use.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to cultural resources.

Beneficial impacts under the alternatives may include minimizing and/or preventing surface disturbance, avoiding archaeological sites, and/or taking measures to protect sites from disturbance. Adverse impacts generally result from ground-disturbing activities that damage archaeological sites and/or disrupt cultural landscapes, reducing their informational potential. Direct impacts to cultural resources may include, ground disturbance that disrupts or removes soil-containing artifacts and/or other cultural materials, disturbance of cultural features, and disturbance of aboveground structural remains and/or rock art. Impacts occur as a result of the public accessing areas with cultural resources, which may result in inadvertent damage, as well as in vandalism and looting. Erosion, due to livestock grazing, recreation, and/or other means of surface disturbances, can also result in adverse impacts.

Cultural resources management in the Monument is dictated by Section 106 of the National Historic Preservation Act (NHPA), which requires Federal agencies to take into account the impacts of their actions on eligible historic properties. The Monument goes one step further, treating all sites as though they were eligible for management in accordance with the NHPA. Regardless of alternative, prior to any Federal action taken in the Monument, the BLM must consider impacts to cultural resources. Sites that have the potential of incurring direct impacts would be avoided or would be protected, when at all possible. If protection or avoidance is not possible, the adverse impacts would be mitigated through an appropriate method of scientific investigation. For the most part, isolated finds would not be afforded this level of protection.

The impacts of livestock grazing on cultural resources vary due to the non-uniform grazing patterns that occur as a result of differences in terrain, forage abundance and preference, soil attributes, and/or cultural resource site distribution. Livestock cause impacts to cultural resources by trampling cultural deposits, creating trails, and rubbing against masonry walls. A recent cultural resource investigation in the Monument found that 40 percent of sites in the study area sustained minor damage from livestock (Hovezak et al. 2003). Livestock congregating in areas located at, or near, water sources, fence lines, and/or shaded areas that also contain cultural sites, are likely to result in localized heavy damage to sites.

Recreational use of the Monument is likely to result in unintentional damage to cultural resources that, although individually minor, may create widespread, adverse impacts over time. Examples of such impacts include, but are not limited to, collecting rocks/stones from cultural sites to create fire rings; building campfires in cultural deposits; creating trails through sites (that, in turn, may accelerate erosion); sitting, standing, and/or climbing on walls; shooting rock art panels; and relocating artifacts by creating "collector's piles".

Impacts from fire vary, depending upon the extent, intensity, and duration of the fire, as well as the type of resource(s) that are burned. Examples of such impacts include, but are not limited to, total loss of site elements that are flammable, spalling (which is the spontaneous chipping, fragmentation, and/or separation of a surface or surface coating) of rock faces, alteration of time dating potential, and post-fire erosion. Disturbance to cultural resource sites may also result from fire suppression activities, such as from ground disturbance associated with the creation of hand lines or the use of mechanized equipment. A particular site's vulnerability to the impacts of fire can be ranked by the presence of specific attributes, as follows: 1) rock art; 2) historic structures; 3) above-ground prehistoric structures and/or features; 4) surface artifact scatters; and 5) subsurface sites.

Cultural resources are finite and irreplaceable; therefore, adverse impacts are permanent. Beneficial impacts cannot reverse adverse impacts; therefore, every impact to a cultural resource site is considered cumulative. Even minor impacts accrue over time, resulting in deteriorating site condition and loss of important scientific data.

4.2.2.1. Evaluation Criteria and Assumptions

It is difficult and complicated to measure individual components of adverse impacts to cultural resources. Most direct impacts to cultural resources result from surface disturbances; therefore, areas with surface disturbances are the primary parameter for the discussion and comparison of this impact analysis. Areas otherwise improved or protected from ground disturbance are used to describe beneficial impacts. Estimates of surface disturbance areas associated with potential management actions were calculated using data from the AMS (BLM 2005b) and the RFD (BLM 2005c), and are summarized in Table 4-1. Proposed surface-use restrictions are listed and summarized in Table 2-1. In some instances, when impacts cannot be quantified, a descriptive, qualitative analysis is used.

Assumptions used in analyzing impacts to cultural resources include the following:

- The existing cultural resource database for the Monument consists of 4,939 known sites. This number and these known locations are referred to for analyses and discussion of impacts to known sites.
- The potential total number of cultural sites in the Monument is estimated using the total number of sites recorded to date (5,157), which is averaged over the number of acres surveyed to date. The resulting average site density is 112 known sites per square mile (mi²) [one site per 5.72 acres], or a total of 28,671 sites. This assumption is used in the analysis, with the acknowledgment that cultural sites do not occur uniformly across the Monument.
- Quantitative assessments for impacts to cultural resources from recreation management use Special Recreation Management Area (SRMA) acreages and the average number of cultural resource sites per acre.
- For the purpose of comparing alternatives, no distinction is made between motorized (paved and natural surface), mechanized, and non-motorized road width when it comes to calculating acres of disturbance and their impact on cultural resources.
- Impacts on cultural resources from the transportation system are presented in the following three ways:
 - The first method includes the total length of all roads and the associated acres of disturbance multiplied by the average number of cultural resource sites per acre. Using the average for local roads, which is a 24' road crown width and 48' disturbance width, it was estimated that for every mile of road approximately 5.8 acres of ground are disturbed (BLM 9113 Roads Manual, 1985).
 - The second method incorporates the Colorado BLM protocol regarding the NHPA Section 106 requirements for comprehensive travel and transportation management planning with regard to defining the area of potential effect (APE) of a road as a 100-foot-wide corridor (i.e., 50 feet on each side of the centerline).
 - The third method incorporates the Colorado BLM transportation protocol assumption that cultural sites within 0.25 miles of a road are more subject to indirect impacts, including looting and/or vandalism, than are backcountry sites. This distance is used as a threshold for analyzing adverse impacts due to the documented association between vandalism and ease of road access (Nickens et al. 1981, Hovezak et al. 2003). In order to apply this method, a 0.5-mile corridor along the total miles of roads for each alternative was converted to acres, and the number of cultural resource sites estimated to occur within that acreage was determined.

- Not all existing roads were surveyed for cultural resources prior to their construction; therefore, the number of cultural sites originally impacted by these roads cannot be known. The impact analysis includes the number of known sites on existing roads, along with the estimated number of sites on proposed new roads.
- New surface disturbances (actions) must meet the requirements of the NHPA Section 106 compliance by taking into account their historic properties. Potential disturbance attributed to new fluid minerals development may require application of specific cultural resource stipulations. Old disturbances, such as existing roads, were mostly in place prior to Section 106; therefore, impacts to cultural resources were likely to have occurred. Calculations for both new and old ground disturbances are only used in a relative sense, in order to compare alternatives.
- It is assumed that all roads predicted for availability of acres for new oil and gas leases will be new roads.
- It was not possible to determine the number of sites that could be impacted by livestock grazing and range management. Impacts were assumed to accrue in proportion to the relative number of active AUMs available under each analyzed alternative.
- Potential impacts from fuels and fire management actions could not be quantified; therefore, they were compared on the basis of which action alternative provided greater or lesser degrees of protection to cultural resources.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Watersheds associated with the Monument were used as the cumulative impacts analysis area.

4.2.2.2. Alternative Analysis

Impacts to cultural resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions proposed for cultural resources, as well as those anticipated to result from the management actions proposed for fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Cultural Resources Management

Under Alternative I, cultural resources would continue to be protected under the NHPA Section 106 compliance requirements, and developed for visitation and interpretation. Five cultural sites are currently developed for public use. Although opening sites to public visitation may result in beneficial impacts (due to the fact that site interpretation may help educate the public about the importance of cultural resources), it may also create the potential for physical damage to cultural sites. Some of this visitor-caused damage may be prevented or lessened through management techniques, including rerouting or hardening roads, controlling access, as well as other methods. Two hundred and forty (240) sites are identified as needing stabilization and/or repair.

Alternative I would allow research on cultural resources by qualified institutions and individuals. Development of research goals, research requirements, and the evaluation of investigation-initiated research would be conducted by Monument staff.

Fluid Minerals Management

Under the No Action Alternative (Alternative I), currently unleased areas would continue to be unavailable for new fluid minerals leases; therefore, cultural sites on unleased areas would be protected from potential fluid mineral-related impacts. Development of current leased areas would continue, and cultural resources would continue to be protected under the NHPA Section 106 compliance requirements. Guidelines for geophysical surveys would include the following additional protective measures for cultural resources: 1) explosives would be kept at least 500 feet from standing walls and have a maximum of 20- to 40-pound charge to minimize impacts from concussion and vibration; and 2) bulldozers and other earthmoving equipment would be allowed, but would generally be limited to maintenance and/or repair of existing roads. No acres of lands would be available for new fluid minerals leases; therefore, no impacts to cultural resources are predicted.

Rangeland Resources Management

Under Alternative I, rangeland resources are based on 8,492 active Animal Unit Months (AUMs). In accordance with BLM Instruction Memorandum No. CO-2002-029, Interim Historic Preservation Guidelines and Procedures for Evaluating the Effect of Rangeland Management Activities on Historic Properties, cultural resource inventories of livestock concentration areas would be conducted during the life of the grazing permit (BLM 2002b). Existing conditions would be analyzed and, when necessary, livestock grazing would be reduced and/or controlled/mitigated to protect cultural resources. Adverse impacts may occur at a small number of sites, where livestock concentrate, and a large number of sites may be impacted, to a smaller degree, by erosion and by trampling.

Recreation and Transportation Management

The No Action Alternative would allow dispersed recreational camping throughout the Monument. This recreational use has the potential to impact all of the 28,671 cultural resource sites estimated to be present in the Monument. Although this is unlikely given the remote nature of much of the Monument and the level of dispersed camping that occurs. Few restrictions occur under the No Action Alternative in regard to camping, campfires, geocaching, and rock climbing.

Under Alternative I, the transportation system would include 149 miles of roads. Using the three methods for determining impacts described under Evaluation Criteria and Assumptions above, there would be the potential for direct impacts to 151 cultural sites, direct and indirect impacts to 315 cultural resource sites using the APE, and the potential for direct and indirect impacts to 8,336 sites (these sites may be vulnerable to impacts due to the fact that they are within 0.25 miles of a road).

Furthermore, based on current levels of use and expected increased levels of use of the Monument, an increase in the numbers of user-created roads may also be anticipated, especially since no transportation plan would be established as part of this alternative. This may result in damage to many more cultural resource sites.

Other Resources Management

Under Alternative I, suppression of wildland fire would be guided by a number of fire management zones (FMZs), which offer varying degrees of protection to cultural resources. The focus on fire suppression is intended to protect cultural resources. However, indirect impacts of this fire suppression may result in a build-up of fuels, such as dead-and-down trees, which, in turn, may increase the risk of larger wildfires.

Under the No Action Alternative (Alternative I), mechanized equipment would be generally permitted during fire-suppression activities if a cultural resource monitor is present. Current management has few requirements regarding the proximity of mechanical fuels management or prescribed fires to cultural resources. Impacts to cultural resources from prescribed fire would be minimized through Section 106 compliance requirements, as well as by management taking into account the impacts of fire-suppression actions on historic properties.

Alternative II

Cultural Resources Management

Although cultural resources would continue to be managed under Section 106 compliance requirements, this alternative would emphasize the protection of cultural resource communities, sites, and/or isolated finds. Consequently, management would focus not only on individual cultural resource sites, but also on how the sites relate to one another.

Alternative II would develop the outdoor museum concept, which involves a self-discovery visitor experience of cultural resources in their natural landscape. Approximately 13 sites would be developed for public use. The developed sites would have publicized locations, but only minimal stabilization and interpretive signage, infrastructure, and/or visitor services. Although opening sites to public visitation may result in long-term beneficial impacts to the resource base as a whole (due to the fact that site interpretation may help to educate the public about the importance of cultural resources), it may also create the potential for physical damage to the developed sites. Under this alternative, standing wall features would be thoroughly documented, then allowed to deteriorate through natural erosive forces, except at sites developed for public use. There may be exceptions, at the discretion of the Monument Manager.

Under this alternative, Special Recreation Permits (SRPs) allowing visits to archaeological sites would be issued. These SRPs would require that experienced and knowledgeable supervisors guide groups to educate participants about the cultural history of the Monument, backcountry site visitor etiquette, and stewardship. Permittees would be trained in site monitoring and would be required to complete monitoring inspections for each visit and to submit their written results to the BLM. These permit requirements may result in beneficial impacts to cultural resources.

Development of research goals and research requirements, and the evaluation of investigator-initiated research would be conducted by a Cultural Resources Advisory Panel.

Fluid Minerals Management

Similar to all of the action alternatives, a Geographic Area Development Plan (GADP) would be used for all fluid minerals development within existing leases in the Monument. The GADP would take into account the potential impacts of fluid minerals development on cultural resources on a landscape scale. Development of currently leased areas would continue. Under Alternative II, up to 880 acres of lands currently unavailable for leasing could be leased, with an NSO stipulation that protects cultural resources. Based on the average site density, up to 154 sites may be found during cultural resource inventory of these newly available lease areas. Some impacts to these resources may be expected, even with the NSO stipulation.

Completion of GADP surveys and issuance of new leases with NSO stipulations may result in beneficial impacts to the cultural resources of the Monument. This is because the surveys would result in a clearer understanding of the Monument's resources on a landscape scale, which would, in turn, allow for better protection and preservation, and the reduction of surface disturbance.

Under Alternative II, the use of explosives in geophysical operations would be prohibited, as would seismic operation-related work by bulldozers and/or other earthmoving equipment. These fluid minerals management actions may result in beneficial impacts, due to the fact they limit ground disturbance. In addition, geophysical operations using vibroseis would be no closer than 500 feet from any cultural resource site (including rock art), which may result in a beneficial impact to cultural resources.

Under Alternative II, fluid minerals management would restrict fluid mineral-related activities for the protection of cultural resources and the cultural landscape of the Monument. The tighter restrictions and requirements on fluid minerals activities may result in substantial protection for cultural resources, when compared to current management. In spite of the estimated total ground disturbance (up to 18 acres) from new fluid minerals development for this alternative, impacts to cultural resource sites would be reduced or eliminated through the use of protective restrictions.

Rangeland Resources Management

Under Alternative II, rangeland resources would be managed to reduce conflicts between livestock grazing and the Monument's mandate to protect cultural resources. This would occur through such management techniques as reducing livestock AUMs and the number of livestock grazing allotments, managing season of use, and managing the percentage of forage utilization.

Under Alternative II, livestock allocation would be 6,437 active AUMs. Five allotments (124 AUMs) would be closed. In accordance with BLM Instruction Memorandum No. CO-2002-029, a cultural resource inventory of livestock concentration areas would be conducted during the life of the grazing permit (BLM 2002b). Existing conditions would be analyzed and, when necessary, livestock grazing would be reduced and/or controlled to protect cultural resources. All sites would be assessed for livestock impacts and mitigated. The smaller numbers of AUMs allowed under Alternative II, the closing of five allotments where major sensitive cultural resources exist, the restrictions on livestock grazing, and the associated increase in ground cover and subsequent soil stability may result in beneficial impacts to cultural resources.

Recreation and Transportation Management

Alternative II would identify and manage Recreation Management Zones (RMZs) and SRMAs. Under this alternative, minimal facilities and infrastructure would be developed to support recreation and transportation use. Camping, campfires, recreational shooting (target shooting), geocaching, and/or climbing (rock climbing, rappelling, and/or bouldering) would not be permitted within the Monument. All of these activities are allowed under current management. Due to their potential to damage a large number of sites (estimated at 28,671), the restrictions imposed under Alternative II would protect cultural resources throughout the Monument.

Under Alternative II, a minimal number of access roads would be maintained, and establishment of a transportation enforcement plan would be required within one year of signing of the ROD. Most existing user-created roads would be closed and reclaimed. The transportation system would consist of 139 miles of roads. Using the three methods for determining impacts described under Evaluation Criteria and Assumptions above, there is the potential for direct impacts to 140 cultural sites, direct and indirect impacts to 295 cultural resource sites using the APE, and the potential for direct and indirect impacts to 7,776 sites, (which may also be considered vulnerable to impacts due to the fact they are located within 0.25 miles of a road).

Other Resources Management

As with all action alternatives, the entire Monument is designated as one FMZ. Natural fire is not desired and wildland fire suppression is emphasized. The focus on fire suppression is

intended to protect cultural resources; however, indirect impacts of this fire suppression may result in a build-up of fuels, such as dead-and-down trees, which, in turn, may increase the risk of larger wildfires.

Disturbance to cultural resource sites may also result from fire suppression activities, such as from ground disturbance associated with the creation of hand lines and/or the use of mechanized equipment. Under Alternative II, the use of mechanized equipment would generally be prohibited during fire-suppression activities. The use of ground-disturbing, mechanized equipment would be permitted if the fire is threatening life or property, and if a minimum of one permitted and fireline-qualified Cultural Resource Monitor (CRM) or agency CRM monitors the use of such equipment. Under Alternative II, prescribed fire would not be authorized within 150 feet of sites, and mechanical fuels management or vegetation management treatment methods, including manual pulling and/or the use of hand tools (e.g., chainsaws, machetes, pruners), would not be authorized within 50 feet of cultural resources. The specificity of the requirements regarding proximity of ground-disturbing activities may result in beneficial impacts to cultural resources, due to the potential of decreased risk to Monument objects.

Under Alternative II, in order to protect the cultural resources of the Monument, fuels and fire management would be highly restrictive regarding fire suppression and fuels reduction activities. These restrictions and requirements may better help protect cultural resources, when compared to current management.

Alternative III

Cultural Resources Management

Alternative III emphasizes the protection of cultural resource communities and sites, and natural resource values while, at the same time, providing for resource use and development. Cultural resource management would focus not only on individual cultural resource sites themselves, but also on how the sites relate to one another across the landscape. As in Alternative II, this alternative would also develop the outdoor museum concept, which involves a self-discovery experience of cultural resources in their natural landscape. Thirteen cultural sites would be developed for public use, and interpretive signage would be installed. Up to 12 additional sites would be developed, based on a long-range interpretive plan. Although opening sites to public visitation may result in beneficial impacts to the resource base as a whole (due to the fact that site interpretation may help to educate the public about the importance of cultural resources), it may also create the potential for minor-to-moderate physical damage to the developed sites. Some visitor-caused damage may be prevented or mitigated through management techniques, including stabilizing sites, rerouting/hardening roads, controlling access, as well as through other methods. Standing wall features would be thoroughly documented, then allowed to deteriorate through natural erosive forces, except at sites developed for public use. There may be exceptions, at the discretion of the Monument Manager.

Under this alternative, SRPs to visit archaeological sites would be issued and would require that experienced and knowledgeable supervisors be provided for groups in order to educate participants about the cultural history of the Monument, backcountry site visitor etiquette, and stewardship. Permittees would be trained in site monitoring and would be required to complete monitoring inspections for each visit and to submit their written results to the BLM. These permit requirements may result in beneficial impacts to cultural resources.

Under this alternative, the BLM would develop research goals and research requirements, with peer review.

Fluid Minerals Management

Similar to all of the action alternatives, a GADP would be used for all fluid minerals development within existing leases in the Monument. The GADP would take into account the impacts of fluid minerals development on cultural resources on a landscape scale. Development of currently leased areas would continue. Under Alternative III, up to 3,021 acres of land currently unavailable for leasing could be leased with an NSO stipulation that protects cultural resources. Based on the average site density, 528 sites may be found during cultural resource inventory of these newly available lease areas. Some direct impacts to these resources may be expected, even with the protective measures outlined for this alternative.

Completion of GADP surveys and issuance of new leases with NSO stipulations would provide protection for cultural resources of the Monument. This is because the surveys would result in a clearer understanding of the Monument's resources on a landscape scale, which may, in turn, allow for better protection and preservation, and may result in the reduction of surface disturbance.

Under Alternative III, the use of explosives in geophysical operations would be limited to at least 500 feet from cultural resource sites (including rock art) and to a maximum of 20- to 40-pound charges. Bulldozers and/or other earthmoving equipment would be limited to maintenance and/or repair of BLM-designated roads during seismic operation-related work. These management actions are intended to avoid or minimize impacts to cultural resources, and may result in beneficial impacts. In comparison to Alternative II, however, these measures are less protective because they allow explosives and earth-moving activities to occur. Similar to Alternative II, geophysical operations using vibroseis would be allowed no closer than 500 feet from any cultural resource site (including rock art).

Similar to Alternative II, the fluid minerals management under Alternative III would highly restrict fluid minerals-related activities in order to protect cultural resources and the cultural landscape of the Monument, when compared to current management. The level of restriction and regulation of fluid minerals activities is slightly less than that of Alternative II, and may result in beneficial impacts to cultural resources. Based on the estimated total ground disturbed from new fluid minerals development for this alternative (up to 73 acres), few if any impacts to cultural resource sites are predicted due to these protective restrictions.

Rangeland Resources Management

Under Alternative III, rangeland resources would be managed to reduce conflicts between livestock grazing and the mandate to protect cultural resources. Under Alternative III, livestock capacity would be 8,368 active AUMs. Five allotments (124 AUMs) would be closed to grazing. The Monument would meet Public Land Health Standards (BLM 1997) through implementing the reduction of authorized use, adjusting duration and extent of spring livestock grazing, implementing rest-rotation grazing schedules, and managing the percent of forage utilization.

In accordance with BLM Instruction Memorandum No. CO-2002-029, a cultural resource inventory of livestock concentration areas would be conducted during the life of the grazing permit (BLM 2002b). Existing conditions would be analyzed and, when necessary, livestock grazing would be reduced and/or controlled to protect cultural resources. All sites would be assessed for livestock impacts and mitigated. Adverse impacts may be expected to occur at a small number of sites, where livestock concentrate, and a large number of sites may be impacted, to a lesser degree, by erosion and by trampling.

Recreation and Transportation Management

Under Alternative III, RMZs and SRMAs would be identified and managed. Some facilities and infrastructure would be developed to support recreation and transportation use. Parking areas would be developed, accommodating up to 10 vehicles at the Pueblo Sites, Sand Canyon, and Rock Creek SRMAs, as well as for roads leading to National Park Service units within the Monument. Recreational shooting (target shooting), geocaching, and/or climbing (rock climbing, rappelling, and/or bouldering) would be prohibited anywhere in the Monument. Camping and campfires would be prohibited within the Pueblo Sites, Sand Canyon/Rock Creek, and/or the Anasazi Heritage Center (AHC) SRMAs, but would be allowed elsewhere. The 146,493 acres where unregulated camping is currently allowed have the potential to contain as many as 25,610 cultural resource sites, based in the Monument's average site density of one site per 5.72 acres. Recreational use of the Monument may likely result in unintentional damage to these cultural resources that, although individually minor, may create widespread, adverse impacts through time.

Under this alternative, the transportation system would include 189 miles of roads. Using the three methods for determining impacts described under Evaluation Criteria and Assumptions above, there is the potential for direct impacts to 192 cultural sites, direct and indirect impacts to 40 cultural resource sites using the APE, and the potential for direct and indirect impacts to 10,573 sites (which may also be considered vulnerable to impacts because they are located within 0.25 miles of a road).

To estimate the total number of sites that could be directly impacted by the transportation system for this alternative, a total of 1,096 disturbed acres is divided by 5.72 acres per site, equaling 192 potentially impacted sites. Considering the BLM Handbook standards for NHPA Section 106 requirements, which define the APE of roads as a 100-foot-wide corridor, the 189 miles of roads planned for this alternative have the potential to directly and indirectly impact 401 cultural resource sites.

Other Resources Management

As with all of the action alternatives, the entire Monument is designated as one FMZ. Natural fire is not desired and wildland fire suppression is emphasized. The focus on fire suppression is intended to protect cultural resources; however, indirect impacts of this fire suppression may result in a build-up of fuels, such as dead-and down-trees, which, in turn, may increase the risk of larger, wildfires.

Disturbance to cultural resource sites may also result from fire suppression activities, such as from ground disturbance associated with the creation of hand lines and/or the use of mechanized equipment. Under Alternative III, the use of ground-disturbing, mechanized equipment would be allowed during fire suppression activities if a minimum of one permitted and fireline-qualified CRM or agency CRM monitors the use of such equipment. Under Alternative III, prescribed fire would not be authorized within 150 feet of sites, and mechanical fuels management and/or vegetation management treatment methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners), would not be authorized within 50 feet of cultural resources. The specificity of these requirements regarding the proximity of ground-disturbing activities may result in beneficial impacts to cultural resources.

Similar to Alternative II, the management of fire under Alternative III would be more restrictive regarding fire suppression and fuels reduction activities designed to protect the cultural resources of the Monument, when compared to current management. The level of restriction and requirement is slightly less than those of Alternative II are and may result in moderate beneficial impacts to cultural resources.

Alternative IV***Cultural Resources Management***

Alternative IV emphasizes the protection of cultural resource communities and sites, and natural resource values while, at the same time, encouraging resource use and development.

Alternative IV emphasizes the protection of cultural resources on a landscape scale; therefore, the focus is not only on individual cultural resource sites, but also on how the sites relate to one another. Alternative IV would develop the “outdoor-museum” concept, which involves a self-discovery experience of cultural resources in their natural landscape. Up to 13 sites would be developed for public use, and 12 additional sites would be developed, based on a long-range interpretive plan. Interpretive signs would be provided at all developed sites. Although opening sites to public visitation may result in beneficial impacts (due to the fact that site interpretation may help to educate the public about the importance of cultural resources), it may also create the potential for minor-to-moderate physical damage to those sites. Some visitor-caused damage may be prevented or mitigated through management techniques, including an emphasis on stabilizing sites, rerouting/hardening roads, controlling access, as well as through other methods.

Under this alternative, SRPs to visit archaeological sites would be issued. Permittees would be encouraged to provide experienced and knowledgeable supervisors for groups in order to educate participants about the cultural history of the Monument, backcountry site visitor etiquette, and stewardship. Permittees would be trained in site monitoring and would be encouraged to complete monitoring inspections for each visit and to submit their written results to the BLM. These permit requirements may result in beneficial impacts to cultural resources, depending on the degree of compliance.

Development of research goals and research requirements, as well as the evaluation of investigator-initiated research, would be conducted by Monument staff, who would seek out and consider input from knowledgeable outside researchers.

Fluid Minerals Management

Similar to all of the action alternatives, a GADP would be used for all fluid minerals development within existing leases in the Monument. The GADP would take into account the impacts of fluid minerals development on cultural resources on a landscape scale. Under all of the alternatives, development of currently leased areas would continue. Under Alternative IV, up to 24,462 acres of lands currently unavailable for leasing could be leased with an NSO stipulation that protects cultural resources. Based on the average site density, 4,277 sites may be found during cultural resource inventory of these newly available lease areas. Impacts to these resources are expected to be reduced or eliminated as a result of protective restrictions.

Unlike the other action alternatives, Alternative IV would place few explicit limits on the use of explosives, bulldozers, and/or other earthmoving equipment during geophysical operations. In addition, this alternative lacks a defined minimum distance from cultural resource sites during geophysical operations using vibroseis. The general lack of explicit limits increases the potential for inadvertent impacts to cultural resources, although the GADP process may reduce this potential. As with Alternatives I through III and Alternative V, the management actions for fluid minerals would remain focused on avoiding or minimizing impacts to cultural resources, and therefore, may result in indirect beneficial impacts.

Unlike Alternatives II and III, the management of fluid minerals under Alternative IV would be less restrictive of fluid mineral-related activities than under current management. As such, it may result in adverse impacts to cultural resources.

Rangeland Resources Management

As with the No Action Alternative (Alternative I), rangeland capacity under Alternative IV would be 8,492 AUMs. No allotments would be removed from availability, and the small number of acres outside current allotment boundaries could be grazed.

In accordance with BLM Instruction Memorandum No. CO-2002-029, cultural resource inventory of livestock concentration areas would be conducted during the life of the grazing permit (BLM 2002b). Existing conditions would be analyzed and, when necessary, livestock grazing would be reduced and/or controlled to protect cultural resources. All sites would be assessed for livestock impacts, and impacts would be mitigated. As with the No Action Alternative, management of rangeland resources under Alternative IV may result in adverse impacts to cultural resources. Adverse impacts may be expected to occur at a small number of sites, where livestock concentrate, and a large number of sites may be impacted, to a lesser degree, by erosion and by trampling.

Recreation and Transportation Management

RMZs and SRMAs would be identified and managed under Alternative IV. Development of destination points and facilities would be emphasized. Parking areas would be developed, accommodating up to 20 vehicles at the Pueblo Sites and at Sand Canyon/Rock Creek SRMAs, as well as for roads leading to NPS units within the Monument. Recreational shooting (target shooting), geocaching, and/or climbing (rock climbing, rappelling, and/or bouldering) would not be allowed anywhere within the Monument. Camping and campfires would be prohibited within the Pueblo Sites, Sand Canyon/Rock Creek, and/or the AHC SRMAs, except in designated sites with fire pits, grates, and/or firepans. Camping would be permitted within the Mockingbird Mesa-Rincon, Squaw-Cross Canyons, and Goodman Point SRMAs. The 118,279 acres where unregulated camping is currently allowed have the potential to contain as many as 20,678 cultural resource sites, based in the Monument's average site density of one site per 5.72 acres. Recreational use of the Monument may result in unintentional damage to these cultural resources that, although individually minor, may create widespread, adverse impacts through time.

Under this alternative, most existing BLM roads would be maintained. No user-created roads would be closed or reclaimed. The recreation/transportation system would consist of 213 miles of roads. Using the three methods for determining impacts described under Evaluation Criteria and Assumptions above, there is the potential for direct impacts to 216 cultural sites, direct and indirect impacts to 451 cultural resource sites using the APE, and the potential for direct and indirect impacts to 11,972 sites (which may also be considered vulnerable to impacts due to the fact that they are located within 0.25 miles of a road).

Alternative IV may result in somewhat fewer direct and indirect impacts to sites than the No Action Alternative, but would not offer the high degree of protection to sites that is afforded by the restrictions imposed under Alternative II.

Other Resources Management

As with all of the action alternatives, the entire Monument is designated as one FMZ. Natural fire is not desired and wildland fire suppression is emphasized. The focus on fire suppression is intended to protect cultural resources; however, indirect impacts of this fire suppression may result in a build-up of fuels, such as dead-and-down trees, which, in turn, may increase the risk of large wildfires.

Disturbance to cultural resource sites may also result from fire suppression activities, such as from ground disturbance associated with the creation of hand lines and/or the use of mechanized equipment. Under Alternative IV, the use of ground-disturbing, mechanized equipment would be allowed during fire suppression activities if a minimum of one permitted and fireline-qualified CRM or agency CRM monitors the use of such equipment. Under Alternative IV, the allowed proximity of prescribed fire, mechanical fuels management, and/or vegetation management treatment methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners), to cultural resources would be determined through the environmental review process. These requirements lack the specificity of those under Alternatives II and III, making them slightly less beneficial to cultural resources. The presence of these requirements would continue to offer a decreased risk of impact to cultural resources; however, it is considered to have only beneficial indirect impact to cultural resources.

Similar to Alternative II, the fuels and fire management under Alternative IV would be more restrictive regarding fire suppression and fuels reduction activities that protect the cultural resources of the Monument, when compared to current management. The level of restriction and requirements is slightly less than those of Alternative II and may result in beneficial impacts to cultural resources.

Alternative V (Preferred Alternative)

Cultural Resources Management

Although cultural resources would continue to be managed under Section 106 compliance requirements, this alternative would emphasize the protection of cultural resource communities and sites. This alternative would emphasize the protection of cultural resources on a landscape scale by focusing not only on individual cultural resource sites, but also on how the sites relate to one another. Alternative V would develop the “outdoor-museum” concept, which involves a self-discovery experience of cultural resources in their natural landscape. Thirteen sites would be developed for public use, and 12 additional sites would be developed, based on a long-range interpretive plan. The developed sites would have publicized locations, but minimal stabilization and interpretive signage, infrastructure, and/or visitor services. Although opening sites to public visitation may result in beneficial impacts to the resource base as a whole (due to the fact that site interpretation may help to educate the public about the importance of cultural resources), it may also create the potential for minor-to-moderate physical damage to the developed sites. Standing wall features would be thoroughly documented, then allowed to deteriorate through natural erosive forces, except at sites developed for public use. There may be exceptions, at the discretion of the Monument Manager.

Under this alternative, SRPs to visit archaeological sites would be issued. These SRPs would require that experienced and knowledgeable supervisors be provided for groups in order to educate participants about the cultural history of the Monument, backcountry site visitor etiquette, and stewardship. Permittees would be trained in site monitoring and would be required to complete monitoring inspections for each visit and to submit their written results to the BLM. These permit requirements may result in beneficial impacts on cultural resources.

The BLM would develop research goals and research requirements, with peer review.

Fluid Minerals Management

Similar to all of the action alternatives, a GADP would be used for all fluid minerals development within existing leases in the Monument. The GADP would take into account the impacts of fluid minerals development on cultural resources on a landscape scale. Development of currently leased areas would continue. Under Alternative V, up to 880 acres of lands currently unavailable for leasing could be leased with an NSO stipulation that protects cultural resources.

Completion of GADP surveys and issuance of new leases with NSO stipulations may provide protection of cultural resources of the Monument because they result in a clearer understanding of the Monument's resources on a landscape scale, which in turn, allow for better protection and preservation, and for the reduction of surface disturbance. Based on the average site density, up to 154 sites can be found during cultural resource inventory of these available lease areas. While more protective than Alternatives III and IV, some direct impacts may occur. However, these impacts would be reduced or eliminated as a result of protective restrictions.

Under Alternative V, seismic operation-related work by bulldozers and/or other earthmoving equipment would be prohibited. Geophysical operations using vibroseis or explosives (with up to a maximum of 20- to 40-pound charges) would be allowed no closer than 500 feet from any cultural resource site (including rock art). These management actions may limit ground disturbance in the Monument and limit impacts to cultural resources

Similar to Alternative II, the management of fluid minerals under Alternative V would restrict fluid mineral-related activities in order to protect cultural resources and the cultural landscape of the Monument. The increased restrictions and requirements on fluid minerals activities under Alternative V may result in substantial protections for cultural resources, when compared to current management.

Rangeland Resources Management

Under Alternative V, rangeland resources would be managed to reduce conflicts between livestock grazing, recreational activities, and the Monument's mandate to protect cultural resources. Under Alternative V, livestock would be stocked at 6,437 active AUMs. Five allotments (124 AUMS) would be closed. In accordance with BLM Instruction Memorandum No. CO-2002-029, a cultural resource inventory of livestock concentration areas would be conducted during the life of the grazing permit (BLM 2002b). Existing conditions would be analyzed and, when necessary, livestock grazing would be reduced and/or controlled to protect cultural resources. All sites would be assessed for livestock impacts, and any impacts would be mitigated. The smaller numbers of AUMs allowed under Alternative V and the limitations on livestock grazing may result in greater protection of cultural resources, when compared to current management.

Recreation and Transportation Management

Alternative V would identify and manage RMZs and SRMAs. Overall, minimal facilities and infrastructure would be developed to support recreation and transportation use. Recreational shooting (target shooting) and/or geocaching would be prohibited within the Monument. Camping and campfires would not be permitted within the Pueblo Sites, Sand Canyon/Rock Creek, and/or the AHC SRMAs (7,875 acres), but would be allowed within the Mockingbird Mesa-Rincon, Squaw-Cross Canyons, and Goodman Point SRMAs. Rock Climbing would be allowed in designated location(s) only. The 157,460 acres where dispersed camping would be allowed, would have the potential to contain as many as 27,529 cultural resource sites, based in the Monument's average site density of one site per 5.72 acres. Recreational use of the Monument may result in unintentional damage to cultural resources that, although individually minor, may result in widespread, adverse impacts through time.

Under Alternative V, the establishment of a transportation enforcement plan would be required within one year of signing of the ROD. Most existing user-created roads would be closed and reclaimed. The recreation/transportation system would consist of 169 miles of roads. Using the three methods for determining impacts described under Evaluation Criteria and Assumptions above, there is the potential for direct impacts to 171 cultural sites, direct and indirect impacts to 362 cultural resource sites using the APE, and the potential for direct and indirect impacts to

9,566 sites (which may also be considered vulnerable to impacts due to the fact they are located within 0.25 miles of a road).

Other Resources Management

Similar to the other action alternatives, the entire Monument is designated as one FMZ. Natural fire is not desired and wildland fire suppression is emphasized. The focus on fire suppression is intended to protect cultural resources; however, indirect impacts of this fire suppression may result in a build-up of fuels, such as dead-and-down trees, which, in turn, may increase the risk of large wildfires.

Disturbance to cultural resource sites may also result from fire suppression activities, such as from ground disturbance associated with the creation of hand lines and/or the use of mechanized equipment. Under Alternative V, the use of ground-disturbing, mechanized equipment would be allowed during fire suppression activities if a minimum of one permitted and fireline-qualified CRM or agency CRM monitors the use of such equipment. Under Alternative V, the allowed proximity of prescribed fire, mechanical fuels management, and/or vegetation management treatment methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners), to cultural resources would be determined through the environmental review process. These requirements lack the specificity of those under Alternatives II and III, making them slightly less beneficial to cultural resources.

Similar to Alternative II, fuels and fire management under Alternative V would be more restrictive regarding fire suppression and fuels reduction activities in order to protect the cultural resources, when compared to current management; however, the level of restriction and requirement is slightly less than that of Alternative II.

4.2.2.3. Cultural Resources Management Impact Comparison

The cultural resources impact comparison is shown in Table 4-10. It is important to keep in mind that it is the consequences of various resource management actions that are being compared. For example, the impacts of fire on cultural resources itself is not evaluated, rather the impacts of implementing the proposed fire management actions for each of the alternatives are analyzed.

4.2.2.4. Cumulative Impacts

Past actions that cumulatively contribute to impacts on cultural resources include livestock grazing, vegetation management, mineral development, looting and vandalism, and ongoing natural erosion. These adverse impacts are present outside, as well as inside the Monument.

Prior to establishment of Section 106 of the NHPA, many activities occurred with no regard for the protection of cultural resources. Activities, such as vegetation treatments using chains or harrows, pulled large pieces of equipment across the ground surface in order to remove trees and shrubs. This, and other mechanical treatments, undoubtedly destroyed or impacted many archaeological sites within their path. In addition, many roads within the Monument were constructed prior to the establishment of Section 106 compliance requirements and destroyed or damaged cultural sites, which are still impacted by erosion.

Cultural resources within the Monument are afforded a greater level of protection than those in the region surrounding the Monument. No laws protect cultural resources on private land, other than those relating to human burials. For example, a projected 870 cultural resource sites may exist on the 4,975 acres of private surface/private minerals within the Monument boundary currently leased for oil and gas development (see Section 3.2.5). These sites may likely be destroyed.

Cultural resources on Federal lands outside of the Monument are currently managed under Federal historical preservation legislation, most notably Section 106 of the NHPA. Cultural resource inventories are conducted in advance of proposed development on Federal land. Sites determined to be eligible for placement on the National Register of Historic Places (NRHP) require avoidance of ground-disturbing impacts, excavation, and/or mitigation of adverse impacts. Sites determined to not be eligible for the NRHP, as well as isolated finds, are not afforded protection on Federal lands outside of the Monument.

Due to increasing development pressure, including urban expansion; widespread drilling for oil and gas; construction of pipelines, transmission lines, and roads; as well as to increased visitation to cultural resources and continued livestock grazing, the trend is for increased destruction of cultural resources through time. These impacts may continue on a regional scale and may be in addition to impacts expected from land uses and resource management activities in the Monument. If adverse impacts to cultural resources continue to increase as expected, the preservation of cultural resources on public lands would become even more critical.

Table 4-10 Comparison of Impacts to Cultural Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Cultural Resources	Protect cultural resource sites. Stabilize up to 240 sites. Develop new sites for controlled visitation. Allow scientific research. Identify no specific evaluation process.	Protect cultural resource communities, sites, and isolated finds. Standing walls documented and allowed to deteriorate. Develop 13 sites. Rely on broad-based standing committee of researchers to evaluate research proposals.	Protect cultural resource communities and sites. Standing walls documented and allowed to deteriorate. Develop 13 to 25 sites. Rely on an ad-hoc peer review committee of researchers to evaluate research proposals.	Protect cultural resource communities and sites. Stabilize standing walls. Develop 13 to 25 sites. Rely on Monument staff to evaluate research proposals, while seeking input from knowledgeable researchers.	Protect cultural resource communities and sites. Standing walls documented and allowed to deteriorate. Stabilization allowed under discretion of Monument Manager. Develop 13 to 25 sites. Rely on an ad-hoc peer review committee of researchers to evaluate research proposals.
Fluid Minerals	Lease 0 new acres. Disturb 0 acres. Impact 0 sites.	Make up to 880 new acres available for lease (with up to 18 acres of disturbance, and up to 154 sites potentially impacted).	Make up to 3,021 new acres available for lease (with up to 73 acres of disturbance, and up to 528 sites potentially impacted).	Make up to 24,462 new acres available for lease (with up to 447 acres of disturbance, and up to 4,277 sites potentially impacted).	Make up to 880 new acres available for lease (with up to 18 acres of disturbance, and up to 154 sites potentially impacted).
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,492 AUMs.
Recreation and Transportation	864 acres of disturbance (with 151 sites potentially)	806 acres of disturbance (with 140 sites potentially)	1,096 acres of disturbance (with 192 sites potentially)	1,235 acres of disturbance (with 216 sites potentially)	980 acres of disturbance (with 171 sites potentially)

Table 4-10 Comparison of Impacts to Cultural Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
	impacted).	impacted).	impacted).	impacted).	impacted).
Other Resources: Fuels and Fire	Manage Monument as combination of FMZs A, B, and C. Continue with current fire suppression requirements in order to protect cultural resources.	Manage entire Monument as FMZ B. Increase fire suppression requirements in order to protect cultural resources.	Manage entire Monument as FMZ B. Increase fire suppression requirements in order to protect cultural resources.	Manage entire Monument as FMZ B. Increase fire suppression requirements in order to protect cultural resources.	Manage entire Monument as FMZ B. Increase fire suppression requirements in order to protect cultural resources.

4.2.3. Fuels and Fire Management

The primary goals for fuels and fire management in the Monument are to preserve and protect cultural and natural resources and public and private property while, at the same time, allowing fire to play a natural role in fire-dependent ecosystems. The management objectives related to this goal are to provide a basis for an appropriate management response for each reported wildland fire within the Monument by developing a Fire Management Plan (FMP) that integrates with the San Juan Public Lands 2003 FMP (SJPL FMP) and the Montezuma County and Dolores County Community Fire Plans. The FMP would be based on Fire Management Zones (FMZs), associated restrictions on fire management activities, and appropriate post-fire management. Fire management tactics and strategies would maximize firefighter and public safety; minimize suppression costs, resource loss, and damage; and use prescribed fire in order to realize resource benefits, such as improving landscape diversity in the Monument's vegetation mosaic.

Additional goals for fuels and fire management are the application of fuels and vegetation management treatments in order to reduce the likelihood of resource damage caused by wildfire, improve firefighter and public safety, and achieve vegetation resource management objectives. The management objectives related to this goal include:

- reducing hazardous fuels in and around sensitive cultural resources, critical infrastructure, and designated wildland-urban interface (WUI) boundary areas; and
- utilizing prescribed fire treatment methods in order to improve vegetation conditions in fire-adapted ecosystems.

Another goal for fuels and fire management is to use a collaborative approach to achieve fuels and fire management goals and objectives. The management objectives related to this goal include:

- continuing to develop and improve the Monument's fire program in partnership with relevant governments, agencies, and private landowners; and
- integrating fire management strategies with the SJPL FMP and the Montezuma County and Dolores County Community Fire Plans.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to fuels and fire management.

Beneficial impacts to fuels and fire under the alternatives may include, but are not limited to, manual and/or mechanical vegetation treatments that reduce fuels and return the ecosystem to a natural fire cycle. Adverse impacts to fuels and fire may include, but are not limited to, conflicting objectives between fuels and fire management objectives and those of other resources, the potential for increased risk of impacts to Monument resources due to wildfire, and compromised public and firefighter safety.

4.2.3.1. Evaluation Criteria and Assumptions

Due to the unpredictable nature of fire, and to the general lack of long-term quantitative data, assessment of potential impacts from the management of other resources on the management of fuels and fire is difficult to quantify. However, if a location is developed for public use, it is more likely to have less fuel and, therefore, greater protection from fire. These sites can be quantified.

Assumptions used in analyzing impacts to fuels and fire resources include the following:

- Wildfires pose a significant threat to all cultural resources.
- A number of converging factors that increase the risk of catastrophic wildfire within the Monument include a documented density increase in pinyon-juniper stands, consecutive growing seasons stressed by severe drought conditions, regional *IPS* beetle infestations and widespread tree mortality, and a deterioration of the natural understory to now favor invasive weeds, such as cheatgrass.
- There is a 90 percent risk of very high to extreme fire danger within the Monument and the greatest impact may be on the ecology of pinyon-juniper woodlands and big sagebrush habitat types, which cover close to 75 percent of the Monument area.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Cumulative impacts include the urban-interface zones that border the Monument for potential landscape-scale impacts from catastrophic wildfire and/or long-range smoke dispersion.

4.2.3.2. Alternative Analysis

Impacts to fuels and fire may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions proposed for the management of fuels and fire, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Fuels and Fire Management

Under Alternative I, the BLM would maintain existing fuels and fire management practices. The current plan identifies three fire management polygon zones, each with specific management strategies, parameters, and constraints. Alternative I would designate 317 acres of the Yellow Jacket Canyon Riparian Zone as FMP A, with an emphasis on preservation of the habitat. Six areas, totaling up to 7,666 acres, would be designated FMP B, where natural fire would be actively suppressed and hazardous fuel mitigation emphasized. FMP B includes three significant cultural resource sites and three existing communication infrastructure sites. The remainder of the Monument, 95 percent of the management area (157,258 acres), would be designated as FMP C, where under specific conditions and constraints, natural fire would be allowed to burn in order to achieve other resource management objectives. Alternative I would further identify a number of fire management strategies, burned area rehabilitation guidelines, fuels treatment parameters, and general conditions that are common across all management polygons (zones). Alternative I would incorporate the fuels and fire management objectives of the National Fire Plan and the Healthy Forest Restoration Act.

Alternative I would provide fire managers the opportunity to use fire as a resource management tool for areas of up to 1,000 acres, or greater, if conditions warrant. Smoke dispersion from such fires may pose a public relations issue with potential adverse public health and safety implications. Alternative I would propose no strategies for addressing the surrounding wildland-urban interface hazards. In addition, Alternative I may set up conflicting objectives among the various resources, which may, in turn, result in adverse impacts.

Cultural Resources Management

Ongoing cultural resource inventory, site assessment, development, and preservation are primary objectives under Alternative I. Alternative I would identify specific sites for inclusion in FMP B for hazard assessment and mitigation. New discoveries are likely in FMP C, where cultural resource preservation objectives conflict with the utilization of resource-benefit fires.

Fluid Minerals Management

Under Alternative I, there would be no expansion of current fluid minerals leases. Approximately 80 percent of the Monument lands are currently being leased. Under Alternative I, the remaining 20 percent would not be leased and no new wells would be drilled (new wells would be drilled within existing leased areas). No impacts to fuels and fire resources would be expected from Alternative I fluid minerals management, because no new development would occur.

Rangeland Resources Management

Rangeland management provides livestock access to specific allotments within the Monument for livestock grazing. Livestock grazing generally reduces the amount of available grassy surface fuels in the short-term and may benefit fire-suppression efforts by reducing the potential surface fire behavior intensity in these allotments. However, cheatgrass typically spreads and encroaches in areas where natural grasses have been removed. This invasive annual grass burns with greater intensity and contributes to a greater potential rate of spread in the event of a wildfire. The majority of livestock grazing allotments are located in FMP C, where the presence of cheatgrass is likely to complicate efforts to manage naturally-occurring fire regimes for resources benefit. Maintaining current livestock grazing levels, in spite of the fact that surface fuels are temporarily reduced as a result, may promote the proliferation of cheatgrass and may, in turn, create long-term adverse impacts to fuels and fire management.

Recreation and Transportation Management

With the exception of the Lowry, Painted Hand, and Sand Canyon Pueblos, dispersed, low-impact recreational opportunities are emphasized throughout the Monument. Low-impact recreation, such as hunting, dispersed camping, and backpacking, has little to no impact on current fuels and fire management. The presence of campfires may increase the risk of a wildfire. Developed sites, such as the up to 240 cultural resource sites and 7 transportation support facilities, would have onsite fuels reduction.

Under Alternative I, the Monument travel system would include 149 miles of roads (on 864 acres). The transportation network may present an immediate and long-term benefit to fuels and fire management in that it may provide local and backcountry access roads for faster incident response, as well as anchor points for fire lines and burnout operations. Additionally, roads would facilitate the use of Minimum Impact Suppression Tactics (MIST) that target existing transportation networks for tactical use during indirect attack.

Alternative II**Fuels and Fire Management**

Under Alternative II, FMPs would be redesignated as FMZs. Under Alternative II, the entire Monument would be designated as FMZ B, which would reclassify all 157,258 acres of FMP C, and 317 acres of FMP A. The riparian fire-exclusion zone in Yellow Jacket Canyon would be eliminated, as would the utilization of resource-benefit fire as a large-area fuels treatment option. Alternative II would prioritize cultural site preservation over efforts to restore fire-adapted ecosystems to historical conditions, which may eliminate potential conflict between

cultural resources and fuels and fire management objectives. All significant current and future cultural, industrial, and recreational resource sites would be recognized as areas of concern that warrant specific suppression constraints and fire management guidelines, as well as consideration for hazard assessment site surveys and potential fuel reduction treatments. Alternative II would recognize the surrounding wildland-urban interface as a dynamic fuels- and fire-management area that impacts treatment projects in the Monument and thus, would require annual review and collaboration with the Montezuma and Dolores County FMPs. Using prescribed fire as a localized resource management treatment would be authorized under certain conditions and constraints.

Alternative II would provide clear and consistent directives from which to guide fire incident management decisions. The scope of addressable resources would be comprehensive and consistent with other Monument resource objectives, as well as with the FMPs of surrounding jurisdictions. The impacts to fuels and fire management may be long-term and beneficial, due to the fact that Alternative II may eliminate the conflict between cultural resource preservation and the utilization of natural fire as a desired resource management tool. Resolving this conflict may help to simplify potentially complex incident management assignments and ultimately create a safer environment for firefighters.

Cultural Resources Management

Alternative II would enhance public access to cultural sites through the development of 13 sites. This would emphasize site protection and visitation and would define appropriate levels of resource maintenance at highly visible sites. Supporting infrastructure development would be minimal. Consistent and cohesive tactical incident objectives throughout the Monument would provide all sites the same potential level of assessment, mitigation, and protection.

Fluid Minerals Management

Under Alternative II, up to 880 of the 24,462 acres would be available for leasing to protect against drainage. The associated infrastructure expansion may have a minor impact on fuels and fire management. Temporary drilling facilities may pose short-term impacts; permanent structures may pose long-term impacts. Both new and existing fluid minerals facilities would be designated as FMZ B-5, and would require hazardous fuels assessment, possible mitigation work, and may be considered for hazardous fuel-reduction treatment. Expansion of industrial infrastructure in the Monument may adversely impact fuels and fire management by increasing the number of facilities needing protection and by potentially diluting available resources for incident response. Modified suppression tactics would be required in the vicinity of all current and future facility sites.

Rangeland Resources Management

Alternative II would authorize reductions in livestock grazing use, delineate the extent and duration of spring livestock grazing, and implement rest-rotation grazing schedules. Rangeland would be managed to increase rangeland health and to ultimately improve soil and vegetation conditions in the areas under consideration. Although a reduction in cheatgrass is unlikely, improved range health may reduce its spread, which may then, in turn, provide a direct beneficial impact to fuels and fire management.

Recreation and Transportation Management

Under Alternative II, RMZs and SRMAs would be established to promote a “destination management strategy” for recreation and site visitation. These areas would be supported with minimal facilities and infrastructure (7 facilities). All facilities would be considered for wildfire hazard assessment and hazardous fuels treatment projects. Additional infrastructure and the

installation of permanent features may increase the need for site-specific hazardous fuels assessment and treatment, and impact fire suppression tactics, possibly diluting available resources for incident response.

Under Alternative II, the Monument travel system would include 139 miles of roads (on 806 acres). The transportation network may be a beneficial resource for fuels and fire management in that it would provide rapid access roads for faster incident response, as well as anchor points for fire lines and burnout operations. Additionally, roads would facilitate the utilization of MIST that target existing road and trail networks for tactical use during indirect attack. The expanded road network may also support fuel break extensions that aid in fragmenting forest continuity.

Alternative III

Fuels and Fire Management

Under Alternative III, FMPs would be redesignated as FMZs. Under Alternative III, the entire Monument would be designated as FMZ B, which would reclassify all 157,258 acres of FMP C and 317 acres of FMP A. The riparian fire exclusion zone in Yellow Jacket Canyon would be eliminated, as would the utilization of resource-benefit fire as a large-area fuels treatment method. Alternative III would prioritize cultural site preservation over efforts to restore fire-adapted ecosystems to historical conditions, which may eliminate potential conflict between cultural resources and fuels and fire management objectives. All significant current and future cultural, industrial, and recreational resource sites would be recognized as areas of concern that warrant specific suppression constraints and fire management guidelines, as well as consideration for hazard assessment site surveys and potential fuel-reduction treatments. Alternative III would recognize the surrounding wildland-urban interface as a dynamic fuels and fire management area that impacts treatment projects in the Monument and would require annual review and collaboration with the Montezuma and Dolores County FMPs. Using prescribed fire as a localized resource management treatment would be authorized under certain conditions and constraints. Suppression guidelines would allow the use of mechanized equipment, with constraints. Several Alternative III incident oversight requirements would be made less restrictive.

Alternative III would provide clear and consistent directives from which to guide fire incident management decisions. The scope of addressable resources would be comprehensive and consistent with other Monument resource objectives, as well as with the FMPs of surrounding jurisdictions. The impacts to fuels and fire management may be long-term and beneficial, due to the fact that Alternative III may eliminate the conflict between the objectives of cultural resource preservation and the use of natural fire as a desired resource management tool. Resolving this conflict may help to simplify potentially complex incident management assignments and may ultimately create a safer environment for firefighters. Less restrictive oversight requirements may simplify incident management protocols.

Cultural Resources Management

Alternative III would enhance public access to cultural sites through the development of 13 to 25 sites. This would emphasize site protection and visitation and define appropriate levels of resource maintenance at highly visible sites. Supporting infrastructure development would be minimal. Consistent and cohesive tactical incident objectives throughout the Monument would provide all sites the same potential level of assessment, mitigation, and protection.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres would be available for leasing. Temporary drilling facilities may pose short-term impacts; permanent structures may pose long-term impacts. Both

new and existing fluid minerals facilities would be designated as FMZ B-5 under Alternative III, and would be considered for wildfire hazard assessment and hazardous fuel reduction treatment. Expansion of industrial infrastructure in the Monument may adversely impact fuels and fire management by increasing the number of defensible facilities and by potentially diluting available resources for incident response. New facilities would also require hazardous fuels assessment and possible mitigation work. Modified suppression tactics would be required in the vicinity of all current and future facility sites.

Rangeland Resources Management

Alternative III would authorize minor reductions in livestock grazing use, delineate the extent and duration of spring livestock grazing, and implement rest-rotation grazing schedules. Rangelands would be managed to increase land health and ultimately improve soil and vegetation conditions. Although a reduction in cheatgrass is unlikely, improved land health may slow its invasion, which may provide a beneficial impact to fuels and fire management.

Recreation and Transportation Management

Under Alternative III, RMZs and SRMAs would be established to promote a destination management strategy for recreation and site visitation. These areas would be supported with minimal facilities and infrastructure (13 facilities). All facilities would be considered for wildfire hazard assessment and hazardous fuels treatment projects under Alternative III. Additional infrastructure and the installation of permanent features may increase the need for site-specific hazardous fuels assessment and treatment, and impact fire suppression tactics, possibly diluting available resources for incident response.

Under Alternative III, the Monument travel system would include 189 miles of roads (on 1,096 acres). The transportation network may be a beneficial resource for fuels and fire management in that it would provide rapid access roads for faster incident response, as well as anchor points for fire lines and burnout operations. Additionally, roads would facilitate the utilization of MIST that target existing road and trail networks for tactical use during indirect attack. An expanded road network would provide for tactical incident and suppression support, as well as fuel break extensions that aid in fragmenting forest continuity.

Alternative IV

Fuels and Fire Management

Under Alternative IV, FMPs would be redesignated as FMZs. Under Alternative IV, the entire Monument would be designated as FMZ B, which would reclassify all 157,258 acres of FMP C and 317 acres of FMP A. The riparian fire exclusion zone in Yellow Jacket Canyon would be eliminated, as would the utilization of resource-benefit fire as a large-area fuels treatment method. Alternative IV would prioritize cultural site preservation over efforts to restore fire-adapted ecosystems to historical conditions, which may eliminate potential conflict between cultural resources and fuels and fire management objectives. All significant current and future cultural, industrial, and recreational resource sites would be recognized as areas of concern that warrant specific suppression constraints and fire management guidelines, as well as consideration for hazard assessment site surveys and potential fuel reduction treatments. Alternative IV would recognize the surrounding wildland-urban interface as a dynamic fuels and fire management area that impacts treatment projects in the Monument and would require annual review and collaboration with the Montezuma and Dolores County FMPs. Using prescribed fire as a localized resource management treatment would be authorized under certain less restrictive conditions and constraints than in Alternative III. Suppression guidelines would allow the use of mechanized equipment, with constraints, and several Alternative IV incident oversight requirements would be made less restrictive.

Alternative IV would provide clear and consistent directives from which to guide fire incident management decisions. The scope of addressable resources would be comprehensive and consistent with other Monument resource objectives as well as with the FMPs of surrounding jurisdictions. The impacts to fuels and fire management may be long-term and beneficial in that Alternative IV may eliminate the conflict between the objectives of cultural resource preservation and the use of natural fire as a desired resource management tool. Resolving this conflict may help to simplify potentially complex incident management assignments and may ultimately create a safer environment for firefighters. Less restrictive oversight requirements would simplify incident management protocols.

Cultural Resources Management

Alternative IV would enhance public access to cultural sites through the development of 13 to 25 sites. This would emphasize site protection and visitation and define appropriate levels of resource maintenance at highly visible sites. Supporting infrastructure development would be minimal. Consistent and cohesive tactical incident objectives throughout the Monument would provide all sites the same potential level of assessment, mitigation, and protection.

Fluid Minerals Management

Infrastructure expansion under Alternative IV may have a major impact on fuels and fire management. Under Alternative IV, up to 24,462 acres would be available for leasing. Temporary drilling facilities may pose short-term impacts; permanent structures may pose long-term impacts. Both new and existing fluid minerals facilities would be designated as FMZ B-5 under Alternative IV, and would be considered for wildfire hazard assessment and hazardous fuel reduction treatment. Expansion of industrial infrastructure in the Monument may adversely impact fuels and fire management by increasing the number of defensible facilities and by potentially diluting available resources for incident response. New facilities would also require hazardous fuels assessment and possible mitigation work. Modified suppression tactics would be required in the vicinity of all current and future facility sites.

Rangeland Resources Management

Stocking capacity, in terms of active AUMs, would remain the same under Alternative IV as under Alternative I. This alternative would reduce the extent and duration of spring livestock grazing and implement rest-rotation grazing schedules. Rangeland would be managed to increase rangeland health and to ultimately decrease the presence of invasive weeds and improve soil conditions in the areas under consideration. The reduction of cheatgrass as an available surface fuel may lower the intensity of expected fire behavior, which may provide a direct beneficial impact to fuels and fire management.

Recreation and Transportation Management

Under Alternative IV, RMZs and SRMAs would be established to promote a destination management strategy for recreation and site visitation. These areas would be supported with facilities and infrastructure (20 facilities). All facilities would be considered for wildfire hazard assessment and hazardous fuels treatment projects under Alternative IV. Additional infrastructure and the installation of permanent features would increase the need for site-specific hazardous fuels assessment and treatment, and impact fire suppression tactics, possibly diluting available resources for incident response.

Under Alternative IV, the Monument travel system would include 213 miles of roads (on 1,235 acres). The transportation network may be a beneficial resource for fuels and fire management in that it would provide rapid access roads for faster incident response, as well as anchor points for fire lines and burnout operations. Additionally, roads would facilitate the utilization of MIST

that target existing road and trail networks for tactical use during indirect attack. Beneficial indirect impacts may include an expanded road network for tactical incident and suppression support, as well as fuel break extensions that aid in fragmenting forest continuity.

Alternative V (Preferred Alternative)

Fuels and Fire Management

Alternative V would eliminate multiple FMZ categories for the Monument, and designate the entire area as FMZ B, where natural fire is not desired under current conditions and suppression is emphasized. Alternative V would significantly broaden the scope and flexibility of potential wildfire hazard assessment and hazardous fuels treatment sites within the Monument and incorporate the surrounding wildland-urban interface into strategic planning actions. From a tactical incident support perspective, Alternative V would provide Fire Management Officers with constant and cohesive guidelines for mitigation and suppression across the Monument, emphasizing firefighter safety while, at the same time, prioritizing the protection and preservation of all cultural sites, as well as industrial and public infrastructure.

Alternative V would provide clear and consistent directives from which to guide fire incident management decisions. The scope of addressable resources would be comprehensive and consistent with other Monument resource objectives as well as with the FMPs of surrounding jurisdictions. Alternative V may eliminate the conflict between cultural site protection and preservation and the utilization of natural fire as a potential resource management tool. Resolving this conflict and creating cohesive and constant incident management protocols and oversight requirements for the entire Monument may help to simplify potentially complex incident management assignments, which may ultimately create a safer environment for firefighters. Conterminous wildland-urban interface factors would also be taken into consideration under Alternative V. These factors would include incident preplanning with surrounding jurisdictions, identification of offsite risks and hazards, and the development of potential emergency resources. The impacts to the fuels and fire management plan may be long-term and beneficial.

Cultural Resources Management

Alternative V would enhance public access to cultural sites through the development of up to 13 to 25 sites. This would emphasize site protection and visitation and define appropriate levels of resource maintenance at highly visible sites. Supporting infrastructure development would be minimal. Consistent and cohesive tactical incident objectives throughout the Monument would provide all sites the same potential level of assessment, mitigation, and protection.

Fluid Minerals Management

Under Alternative V, up to 880 acres of the available 24,462 acres would be available for leasing to protect against drainage. Infrastructure expansion under Alternative V may have a minor impact on fuels and fire management. Temporary drilling facilities may have short-term impacts; permanent structures may have long-term impacts. Both new and existing fluid minerals facilities would be designated as FMZ B-5 under Alternative V, and would automatically be considered for wildfire hazard assessment and hazardous fuel reduction treatment. Any significant expansion of industrial infrastructure in the Monument may adversely impact fuels and fire management by increasing the number of defensible facilities and by potentially diluting available resources for incident response. New facilities would also require hazardous fuels assessment and possible mitigation work. Modified suppression tactics would be required in the vicinity of all current and future facility sites.

Rangeland Resources Management

Alternative V would authorize reductions in livestock grazing use, delineate the extent and duration of spring livestock grazing, and implement rest-rotation grazing schedules. Rangeland would be managed to increase land health and ultimately improve soil and vegetation conditions. Although a reduction in cheatgrass is not likely, a reduction in its spread may result from improved range conditions. This may provide a beneficial impact to fuels and fire management.

Recreation and Transportation Management

Under Alternative V, RMZs and SRMAs would be established to promote a destination management strategy for recreation and site visitation. These areas would be supported with minimal facilities and infrastructure. All facilities would be considered for wildfire hazard assessment and hazardous fuels treatment. Adversely, any additional infrastructure would increase the number of potential defensible sites and impact suppression tactics, possibly diluting available resources during incident response.

Under Alternative V, there would be 169 miles of roads (on 980 acres). The transportation network may benefit tactical incident response and suppression support in that it would provide faster access and more fuel breaks that aid in fragmenting forest continuity.

4.2.3.3. Fuels and Fire Management Impact Comparison

The fuels and fire impact comparison is shown in Table 4-11. This table compares the consequences of resource management actions under each alternative on fuels and fire.

4.2.3.4. Cumulative Impacts

Cumulative impacts to fuels and fire management may include smoke dispersion (adverse, event-based/temporary), escaped fire from private lands and the surrounding wildland-urban interface (adverse, event-based/temporary, localized, with long-term implications), and potential flash flooding into Monument streams from destabilized burned areas on private lands (adverse, event-based/temporary, localized, with long-term implications). Current conditions in areas adjacent to the Monument, including pinyon-juniper woodland tree density, cheatgrass invasion, insect infestation mortality, poor soil conditions and long-term drought, may increase the likelihood of high-intensity, stand-replacement wildfires. The impacts of unchecked fuels build-up may complicate suppression and control efforts, and possibly compromise firefighter safety.

Table 4-11 Comparison of Impacts to Fuels and Fire Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Fuels and Fire	Conflicting objectives increase risk of damage to Monument resources; compromised public and firefighter safety.	Eliminate conflicts between cultural resource preservation and use of natural fire as a resource management tool.	Eliminate conflicts between cultural resource preservation and use of natural fire as a resource management tool.	Eliminate conflicts between cultural resource preservation and use of natural fire as a resource management tool.	Eliminate conflicts between cultural resource preservation and use of natural fire as a resource management tool.
Cultural Resources	Propose no specific hazardous fuel reduction.	Reduce hazardous fuel at 13 developed sites.	Reduce hazardous fuel at 13 to 25 developed sites.	Reduce hazardous fuel at 13 to 25 developed sites.	Reduce hazardous fuel at 13 to 25 developed sites.
Fluid Minerals	No Impact.	Make up to 880 acres available for new mineral leasing. Require hazardous fuel assessment, mitigation work, and fuel reduction treatment.	Make up to 3,021 acres available for new mineral leasing. Require hazardous fuel assessment, mitigation work, and fuel reduction treatment.	Make up to 24,462 acres available for new mineral leasing. Require hazardous fuel assessment, mitigation work, and fuel reduction treatment.	Make up to 880 acres available for new mineral leasing. Require hazardous fuel assessment, mitigation work, and fuel reduction treatment.
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs.
Recreation and Transportation	Manage 149 miles of roads. Develop 7 facilities.	Manage 139 miles of roads. Decrease access for fire suppression. Develop 7 facilities.	Manage 189 miles of roads. Increase access for fire suppression. Develop 13 facilities.	Manage 213 miles of roads. Increase access for fire suppression. Develop 20 facilities.	Manage 169 miles of road. Increase access for fire suppression. Develop 11 facilities.

4.2.4. Geologic Resources

The primary goal for geologic resources in the Monument is to manage multiple-use activities in a manner that preserves and protects geologic objects protected under the Proclamation. The management objectives related to this goal include:

- manage uses to prevent damage to sensitive geologic and geomorphologic features; and
- facilitate appropriate geologic research to improve understanding of geological resources and processes.

An additional goal for geologic resources management is to protect visitors from geologic hazards.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short- and long-term impacts to geologic resources.

Direct beneficial impacts to geologic resources under the alternatives may include, but are not limited to, reduced erosion and the preservation of geologic features, including outstanding examples of rock formations (e.g., scenic outcrops, type sections, faults, ripple marks, cross-bedding, lithified mudcracks, unconformities, and geomorphic features). Direct adverse impacts to geologic resources may include those actions that would physically disturb and/or destroy geologic features. Additional direct adverse impacts may include increased rockfalls, landslides, flash floods, and erosion; as well, those from human-caused actions, including those that mar the surface of rocks, break and/or erode rock surfaces, and/or those that result in unstable rock outcrops or rock falls.

4.2.4.1. Evaluation Criteria and Assumptions

Quantifying individual impacts to geologic resources is difficult because the location and extent of potential impacts cannot be determined. The location and extent of human-caused disturbance from Monument visitors cannot be predicted; neither can the location and extent of disturbance from oil and gas exploration and production. However, comparing disturbance factors in terms of miles, AUMs, and acres can provide a relative risk from each alternative.

Assumptions used in analyzing impacts to geologic resources include the following:

- Estimates of disturbance were compiled from the AMS (BLM 2005b) and the RFD (BLM 2005c).
- Approximately 3,078 acres, or 2 percent of Monument land, is rock outcrop.
- The number of roads predicted for construction based on new acres leased for mineral development, would all be new roads.
- Federal lands within the boundary of the Monument were used as the impact analysis area for both individual and cumulative impacts.

4.2.4.2. Alternative Analysis

Impacts to geologic resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative resulting from the management of geologic resources, as well as those anticipated to result from the management actions proposed for

cultural resources, fluid minerals, rangeland resources, and recreation and transportation management.

Alternative I (No Action Alternative)

Geologic Resources Management

Alternative I, the No Action Alternative, would continue current Monument management goals and objectives, including managing multiple-use activities to preserve and to protect geologic objects, and minimizing activities in geologic high-hazard areas. No specific management actions would be identified and no impacts are anticipated.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect geologic resources. This is because Alternative I protects sites from all activities except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur because of cultural resource stabilization of 240 sites.

Fluid Minerals Management

Approximately 80 percent of Monument lands are currently being leased. Under Alternative I, the remaining 20 percent would not be leased and no new wells would be drilled; therefore, no impacts to geologic resources would be expected from new fluid minerals management.

Rangeland Resources Management

Rangeland resources management, including managing to Public Land Health Standards, may not impact geologic resources. This is because viable forage is not generally available on exposed geologic resources.

Recreation and Transportation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, as well as maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. No new SRPs would be issued. No restrictions on rock climbing in the Monument exist for this alternative.

Under this alternative, the Monument travel system would include 149 miles of roads (on 864 acres) for motorized, mechanized, and/or non-motorized use. Cross-country motorized and mechanized travel would be prohibited. Erosion may occur as a result of road closures and development.

Other Resources Management

Under this alternative, a soil SSR/CSU would be applied for slopes greater than 40 percent on 1,889 acres of rock outcrop where fossils may be present. The SSR/CSU would require an engineering/reclamation plan that demonstrates how site productivity would be restored, surface runoff would be controlled, and offsite areas would be protected from accelerated erosion. Additionally, surface-disturbing activities would not be allowed during extended wet periods. This restriction may result in beneficial impacts to geologic resources.

Alternative II

Geologic Resources Management

Geologic resources management under Alternative II would include restricting access to sensitive geologic features, encouraging interdisciplinary projects, identifying high-hazard areas

(landslides and rockfalls), and requiring a geologic hazard analysis prior to construction projects. These management actions may result in beneficial impacts to geologic resources.

Cultural Resources Management

Preservation of Monument cultural resource communities, sites, and isolated finds would serve to protect geologic resources. This is because Alternative II would protect large blocks of land from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur because of the development of 13 sites.

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative II, no direct impacts to cultural resource communities, sites, and/or to isolated finds would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources and/or to protect against drainage in existing reservoirs under production. Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of where fossils may be present) would apply, and BMPs would be included in condition of approval (COAs) for new leases.

Based on these restrictions, and on the small amount of new oil and gas development, few or no impacts to geologic resources would be expected from new fluid minerals management.

Rangeland Resources Management

Rangeland resources management, including managing to Public Land Health Standards, may not impact geologic resources because viable forage is not generally available on exposed geologic resources.

Recreation and Transportation Management

Under Alternative II, recreation management would include managing for custodial purposes, user conflicts, visitor safety, and resource protection. Developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos would be maintained. Approximately 8,211 acres would be managed as visitation areas, and 157,124 acres would be managed as backcountry areas. No new SRPs would be issued, and existing SRPs would be allowed to expire. Rock climbing would not be allowed in the Monument.

Under this alternative, the Monument travel system would include 139 miles of roads (on 806 acres) for motorized, mechanized, and/or non-motorized use. There would be no roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Recreation and transportation management may result in beneficial impacts to geologic resources in that they may reduce road development in the Monument.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to geologic resources.

Alternative III

Geologic Resources Management

Geologic resources management under Alternative III would include restricting access to sensitive geologic features, encouraging interdisciplinary projects, identifying high-hazard areas (landslides and rockfalls), and requiring a geologic hazard analysis prior to construction projects. These management actions may result in beneficial impacts to geologic resources.

Cultural Resources Management

Preservation of Monument cultural resource communities and sites would serve to protect geologic resources. This is because Alternative III would protect large blocks of land from all ground-disturbing activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of cultural resource development of 13 to 25 sites; however, development would likely be small scale and site specific.

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative III, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. Under Alternative III, up to 3,021 acres would be available for leasing. A total of 73 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

Based on these restrictions, few impacts to geologic resources would be expected from new fluid minerals management.

Rangeland Resources Management

Rangeland resources management, including managing to Public Land Health Standards, may not impact geologic resources because viable forage is not generally available on exposed geologic resources.

Recreation and Transportation Management

Under Alternative III, recreation management would include a destination management strategy, including establishing destinations for regional visitors, actively marketing communities in the Four Corners area, and providing specific public access points and appropriate support facilities. Up to approximately 18,875 acres would be managed as visitation areas and 146,460 acres would be managed as backcountry areas. No new SRPs would be issued, but existing SRPs could be renewed. Rock climbing would not be allowed in the Monument.

Under this alternative, the Monument travel system would include 189 miles of roads (on 1,096 acres) for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Recreation and transportation management may result in beneficial impacts to geologic resources, in that they may reduce erosion by prohibiting rock climbing in the Monument. However, the increase in road mileage and in the associated ground disturbance may be an adverse impact.

Other Resources Management

A soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to geologic resources.

Alternative IV**Geologic Resources Management**

Geologic resources management under Alternative IV would include restricting access to sensitive geologic features, encouraging interdisciplinary projects, identifying high-hazard areas (landslides and rockfalls), and requiring a geologic hazard analysis prior to construction projects. These management actions may result in beneficial impacts to geologic resources.

Cultural Resources Management

Preservation of Monument cultural resource communities and sites would serve to protect geologic resources. This is because Alternative IV would protect large blocks of land from all ground-disturbing activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as the result of cultural resource development of 13 to 25 sites; however, development would likely include stabilization and/or be small scale and site specific.

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative IV, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. Under Alternative IV, up to 24,462 acres would be available for leasing. A total of up to 447 acres of new ground disturbance would be possible under this alternative.

In accordance with applicable laws and regulations, seismic operation-related work using bulldozers and/or other earthmoving equipment, as necessary, would be allowed to mitigate impacts to objects identified in the Proclamation. If water is visible in the channel at washes, alluvial valleys, and/or in perennial water features, or where riparian vegetation is present, Alternative IV would require that all vehicles associated with geophysical operations cross only at authorized locations following field-based exemption. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

Based on these restrictions, and on the number of new well pads, adverse impacts to geologic resources, including surface marring and erosion, may be expected from fluid minerals management.

Rangeland Resources Management

Rangeland resources management, including managing to Public Land Health Standards, may not impact geologic resources due to the fact that viable forage is not generally available on exposed geologic resources.

Recreation and Transportation Management

Under Alternative IV, recreation management would include a destination management strategy, including establishing destinations for national and international visitors, and providing specific public access points, visitor facilities, access, and appropriate support facilities. Approximately 47,056 acres would be managed as visitation areas and 118,279 acres would be managed as backcountry areas. New SRPs would be issued on a case-by-case basis. Rock climbing would not be allowed in the Monument.

The Monument travel system would include 213 miles of roads (on 1,235 acres) for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Recreation management may result in beneficial impacts to geologic resources in that it would prohibit rock climbing and reduce erosion in the Monument. However, management may increase erosion as a result of increased road development.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to geologic resources.

Alternative V (Preferred Alternative)

Geologic Resources Management

Geologic resources management under Alternative V would include restricting access to sensitive geologic features, encouraging interdisciplinary projects, identifying high-hazard areas (landslides and rockfalls), and requiring a geologic hazard analysis prior to construction projects. These management actions may result in beneficial impacts to geologic resources.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect geologic resources. This is because Alternative V would protect cultural resource communities and sites from all ground-

disturbing activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of the development of 13 to 25 cultural resource sites; however, development would likely include stabilization and/or be small scale and site specific.

Fluid Minerals Management

Under Alternative V, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources and/or to protect against drainage in existing reservoirs under production. Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

Based on these restrictions, little or no impacts to geologic resources would be expected from fluid minerals management.

Rangeland Resources Management

Rangeland resources management, including managing to Public Land Health Standards, may not impact geologic resources. This is because viable forage is not generally available on exposed geologic resources.

Recreation and Transportation Management

Under Alternative V, recreation management would include a combination of strategies. Undeveloped areas with minimal facilities would be combined with destination management strategies for Painted Hand and Sand Canyon Pueblos, the AHC, and Lowry Pueblo RMZs. Approximately 7,875 acres would be managed as visitation areas and 157,460 acres would be managed as backcountry areas. Up to 10 SRPs would be issued. Rock climbing would be allowed in the Monument in designated sites only.

Under this alternative, the Monument travel system would include 169 miles of roads (on 980 acres) for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Recreation management may result in adverse impacts to geologic resources in that it allows rock climbing in the Monument; however, this activity would be restricted to a very few specific sites.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all

ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to geologic resources.

4.2.4.3. Geologic Resources Management Impact Comparison

The geologic resources impact comparison is shown in Table 4-12. This table compares the consequences of resource management actions from each alternative on geologic resources.

4.2.4.4. Cumulative Impacts

Mineral development on private lands within the Monument may result in cumulative impacts, including increased erosion and potential rockfall or landslide hazards. Ground disturbance occurs when additional well pads, pipelines, compressor stations, roads and/or other facilities are built. Mineral development on private land is not subject to the BLM BMPs or to other mitigation measures.

New wells would be drilled within existing leased areas on Federal lands within the Monument, which may result in up to 883 acres of disturbance. Existing stipulations would be enforced, including NGDs/NSOs that protect scenic, natural, cultural, and/or archaeological values, and that protect rare flora and fauna species habitats. SSRs/CSUs would be established for surface disturbance on slopes greater than 40 percent, protection of perennial water impoundments and streams, and riparian/wetland vegetation zones. COAs would be included in all new leases. Additional restrictions would apply to geophysical operations.

Table 4-12 Comparison of Impacts to Geologic Resources

Type of Resource Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Geologic Resources	Take no specific management actions.	Restrict access to sensitive sites. Restrict public activities in high-hazard areas.	Restrict access to sensitive sites. Restrict public activities in high-hazard areas.	Restrict access to sensitive sites. Restrict public activities in high-hazard areas.	Restrict access to sensitive sites. Restricts public activities in high-hazard areas sites.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop up to 13 to 25 sites.
Fluid Minerals	No Impact.	Make 880 new acres available for lease (with up to 18 acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 3,021 new acres available for lease (with up to 73 acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 24,462 new acres available for lease (with up to 447 acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 880 new acres available for lease (with up to 18 acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.
Rangeland Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Recreation and Transportation	Manage 149 miles of roads (with 864 acres of disturbance.). No restrictions on rock climbing.	Manage 139 miles of roads (with 806 acres of disturbance). Prohibit rock climbing.	Manage 189 miles of roads (with 1,096 acres of disturbance). Prohibit rock climbing.	Manage 213 miles of roads (with 1,235 acres of disturbance). Prohibit rock climbing.	Manage 169 miles of roads (with 980 acres of disturbance). Allow rock climbing at specific sites.
Other Resources:	Apply SSR/CSU to protect slopes greater	Apply NGD/NSO for slopes steeper than	Apply NGD/NSO for slopes steeper than	Apply NGD/NSO for slopes steeper than	Apply NGD/NSO for slopes steeper than 30

Table 4-12 Comparison of Impacts to Geologic Resources

Type of Resource Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Soil Resources	than 40 percent (21,036 acres, with 1,889 acres of rock outcrop),	30 percent (36,504 acres, with 2,319 acres of rock outcrop).	30 percent (36,504 acres, with 2,319 acres of rock outcrop).	30 percent (36,504 acres, with 2,319 acres of rock outcrop).	percent (36,504 acres, with 2,319 acres of rock outcrop).

4.2.5. Paleontological Resources

The primary goals for paleontological resources management in the Monument are to preserve and protect scientifically important paleontological resources, and to ensure that they are available for appropriate uses by present and future generations. The management objectives related to this goal include:

- identify areas and geological units containing paleontological resources and evaluate the potential of such areas to contain vertebrate fossils and/or noteworthy occurrences of invertebrate or plant fossils;
- develop management recommendations (including mitigation measures in specific locations) to promote scientific research and other uses of fossils;
- protect and preserve important paleontological localities from natural and human-caused impacts; and
- monitor areas where important paleontological localities have been identified.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short- and long-term impacts to paleontological resources.

Direct adverse impacts to paleontological resources under the alternatives may include, but are not limited to, those that would physically disturb and/or destroy fossils and fossil localities. Erosion may have an adverse impact on fossils by downcutting strata and by exposing fossils to degradation, weathering, theft, and/or vandalism. Direct impacts are caused by human activity, in general, and may directly or indirectly result in the loss and/or damage to paleontological resources as a result of erosion, trampling, ground disturbance, and/or vandalism and illegal collecting. Beneficial impacts occur when fossil resources are protected.

4.2.5.1. Evaluation Criteria and Assumptions

Quantifying individual adverse impacts to paleontological resources is difficult because the location and extent of potential impacts cannot be determined. The location and extent of human-caused disturbance from Monument visitors cannot be predicted; neither can the location and extent of disturbance from oil and gas exploration and production. However, the risk to paleontological resources can be comparatively measured by quantifying disturbance factors in terms of miles or acres.

Assumptions used in analyzing impacts to paleontological resources include the following:

- Approximately 3,078 acres, or 2 percent of Monument land, is rock outcrop.
- Approximately 1,016 acres, or 33 percent of Monument outcrop, are likely to contain fossils.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- The number of roads predicted for construction, based on new acres leased for mineral development, would all be new roads.

4.2.5.2. Alternative Analysis

Impacts to paleontological resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following

sections describe the impacts under each alternative anticipated to result from the management actions proposed for paleontological resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Paleontological Resources Management

Alternative I, the No Action Alternative, would continue current Monument management goals, objectives, and actions, including completing the ongoing compilation and analysis of available paleontological resource data; restricting paleontological collecting to scientific purposes (and only then through use of valid BLM Paleontological Resources Use Permits); and prohibiting recreational fossil collecting, regardless of type (vertebrate, invertebrate, plant, and trace fossils). The beneficial impacts resulting from these management actions are the preservation of fossils and fossil localities.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect paleontological resources. This is because Alternative I would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some adverse impacts may occur as a result of cultural resource stabilization of up to 240 sites; however, management techniques used to stabilize cultural resources may also stabilize erosive and/or unstable paleontological resources as well.

Fluid Minerals Management

Approximately 80 percent of the Monument lands are currently being leased. Under Alternative I, the remaining 20 percent would not be leased and no new wells would be drilled; therefore, no impacts to paleontological resources would be expected from fluid minerals management.

Rangeland Resources Management

Rangeland resources management may not impact paleontological resources because viable forage is not generally available on exposed rock outcrops. Areas where livestock may have the most impact on fossils are in the limited riparian areas where springs or streams have cut into fossiliferous strata, or in overhangs and/or rock shelters.

Recreation and Transportation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, as well as maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. No new SRPs would be issued. No restrictions exist for rock climbing in the Monument.

Under this alternative, the Monument travel system would include 149 miles of roads (on 864 acres) for motorized, mechanized, and/or non-motorized use. Cross-country motorized and mechanized travel would be prohibited.

The existing conditions for transportation and recreation allow for access to remote areas in the Monument. Although there are no fossil localities reported in remote areas, some outcrops may potentially contain fossils. Adverse impacts due to erosion and increased access (which may, in turn, result in vandalism and/or unauthorized fossil collecting) may occur.

Other Resources Management

Under this alternative, a soil SSR/CSU would be applied for slopes greater than 40 percent, including approximately 1,889 acres of rock outcrop where fossils may be present. The

SSR/CSU would require an engineering/reclamation plan that demonstrates how site productivity would be restored, surface runoff would be controlled, and offsite areas would be protected from accelerated erosion. Additionally, surface-disturbing activities would not be allowed during extended wet periods. This restriction may result in beneficial impacts to paleontological resources in that it may reduce erosion.

Alternative II

Paleontological Resources Management

The proposed management actions under Alternative II may provide beneficial impacts to paleontology and fossil management in the Monument. Implementing a program for evaluating and monitoring fossil localities, establishing a paleontological research standard for the Monument, and requiring paleontological clearances and/or mitigation prior to surface disturbance may benefit paleontological resources.

Cultural Resources Management

Under Alternative II, cultural resource development would be marketed as an “outdoor-museum,” allowing visitors to experience Monument resources through self-discovery. This may have adverse impacts on paleontological resources due to erosion and/or unauthorized fossil collecting. The preservation of Monument cultural resources would serve to protect paleontological resources. This is because Alternative II would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal).

Fluid Minerals Management

The overall goal for fluid minerals management in the Monument is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and/or reclamation activity for fluid minerals (i.e., oil, gas, and CO₂). Under Alternative II, no direct impacts to cultural resource communities, sites, and/or isolated finds would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources and/or to protect against drainage in existing reservoirs under production. Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

Overall, with the limited lease area and protective measures in place, little or no impacts to paleontological resources for Alternative II would be expected from fluid minerals management.

Rangeland Resources Management

Rangeland resources management actions for Alternative II may provide beneficial measures for paleontological resources. Livestock may have the most impact on fossils in the limited riparian areas where springs or streams cut into fossiliferous strata, or in overhangs and rock

shelters. Reducing the number of AUMs, especially those with riparian areas, may reduce erosion.

Recreation and Transportation Management

Under Alternative II, recreation management would include managing for custodial purposes, user conflicts, visitor safety, and resource protection. Developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos would be maintained. Approximately 8,211 acres would be managed as visitation areas, and 157,124 acres would be managed as backcountry areas. No new SRPs would be issued, and existing SRPs would be allowed to expire. Rock climbing would not be allowed in the Monument.

Under this alternative, the Monument travel system would include 139 miles of roads (on 806 acres) for motorized, mechanized, and/or non-motorized use. There would be no roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Alternative II transportation and recreation management may provide beneficial impacts to paleontological resources in that it reduces road mileage. Limiting public access may reduce the threat of vandalism and/or unauthorized fossil collecting.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to paleontological resources.

Alternative III

Paleontological Resources Management

The proposed management actions under Alternative III may provide a beneficial impact to paleontology and fossil management in the Monument. Implementing a program for evaluating and monitoring fossil localities, establishing a paleontological research standard for the Monument, and requiring paleontological clearances and/or mitigation prior to surface disturbance may benefit paleontological resources.

Cultural Resources Management

Under Alternative III, cultural resource development would be marketed as an “outdoor-museum,” allowing visitors to experience Monument resources through self-discovery. This may have adverse impacts on paleontological resources due to erosion and/or unauthorized fossil collecting. Preservation of Monument cultural resources would serve to protect paleontological resources. This is due to the fact that Alternative III would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal).

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative III, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations to protect cultural, natural, and scenic resources, and Monument objects. Under Alternative III, up to 3,021 acres

would be available for leasing. A total of up to 73 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

With the limited lease area and protective measures in place, little or no impacts to paleontological resources would be expected for fluid minerals management.

Rangeland Resources Management

Rangeland resources management actions for Alternative III may provide beneficial measures for paleontological resources. Livestock may have the most impact on fossils in the limited riparian areas where springs or streams cut into fossiliferous strata, or in overhangs and rock shelters. Reducing the number of AUMs, especially those with riparian areas, would reduce erosion.

Recreation and Transportation Management

Under Alternative III, recreation management would include a destination management strategy for regional visitors, actively marketing communities in the Four Corners area, and providing specific public access points and appropriate support facilities. Approximately 18,875 acres would be managed as visitation areas, and 146,460 acres would be managed as backcountry areas. No new SRPs would be issued, and existing SRPs could be renewed. Rock climbing would not be allowed in the Monument.

Under this alternative, the Monument travel system would include 189 miles of roads (on 1,096 acres) for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Transportation and recreation management for Alternative III may result in potential adverse impacts to paleontological resources due to the increase in road mileage. Increased recreation and transportation opportunities may increase erosion as a result of more ground disturbance from a greater number of developed sites, and from new road development. The amount of paleontological resources potentially impacted would likely be very small. Expanding public access may increase the threat of vandalism and/or unauthorized fossil collecting.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may result in beneficial impacts to paleontological resources.

Alternative IV

Paleontological Resources Management

The proposed management actions under Alternative IV would provide a beneficial impact to paleontology and fossil management in the Monument. Implementing a program for evaluating and monitoring fossil localities, establishing a paleontological research standard for the Monument, and requiring paleontological clearances and/or mitigation prior to surface disturbance may benefit paleontological resource use.

Cultural Resources Management

Under Alternative IV, cultural resource development would be marketed as an “outdoor-museum,” allowing visitors to experience Monument resources through self-discovery. This may have potential adverse impacts on paleontological resources due to erosion and/or to unauthorized fossil collecting. The preservation of Monument cultural resources would serve to protect paleontological resources. This is because Alternative IV would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal).

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative IV, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. Under Alternative IV, up to 24,462 acres would be available for leasing. A total of up to 447 acres of new ground disturbance would be possible under this alternative.

In accordance with applicable laws and regulations, seismic operation-related work using bulldozers and/or other earthmoving equipment, as necessary, would be allowed to mitigate impacts to objects identified in the Proclamation. If water is visible in the channel at washes, alluvial valleys, and/or in perennial water features, or where riparian vegetation is present, Alternative IV would require that all vehicles associated with geophysical operations cross only at authorized locations following field-based exemption. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases. Although proactive measures would be in place, the large area of disturbance associated with this alternative may increase the possibility of disturbance to paleontological resources.

Rangeland Resources Management

Rangeland resources management may not impact paleontological resources due to the fact that viable forage is not generally available on exposed rock outcrops. Areas where livestock may have the most impact on fossils are in the limited riparian areas where springs or streams have cut into fossiliferous strata, or in overhangs or rock shelters.

Recreation and Transportation Management

Under Alternative IV, recreation management would include a destination management strategy, including establishing destinations for national and international visitors, and providing specific public access points, visitor facilities, access, and appropriate support facilities. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be

managed as backcountry areas. New SRPs would be issued on a case-by-case basis. Rock climbing would not be allowed in the Monument.

Under this alternative, the Monument travel system would include 213 miles of roads (on 1,235 acres) for motorized, mechanized, and/or non-motorized use. There would be no roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Transportation and recreation management for Alternative IV may result in potential adverse impacts to paleontological resources due to the increase in road mileage. Increased recreation and transportation opportunities may increase erosion as a result of more ground disturbance from a greater number of developed sites, as well as from new road development. The amount of paleontological resources potentially impacted would likely be very small. Expanding public access may increase the threat of vandalism and/or unauthorized fossil collecting.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may result in beneficial impacts to paleontological resources.

Alternative V (Preferred Alternative)

Paleontological Resources Management

The proposed management actions under Alternative V would provide a beneficial impact to paleontology and fossil management in the Monument. Implementing a program for evaluating and monitoring fossil localities, establishing a paleontological research standard for the Monument, and requiring paleontological clearances and/or mitigation prior to surface disturbance may benefit paleontological resources.

Cultural Resources Management

Under Alternative V, cultural resource development would be marketed as an “outdoor museum,” allowing visitors to experience Monument resources through self-discovery. This may have potential adverse impacts on paleontological resources due to erosion and/or unauthorized fossil collecting. The preservation of Monument cultural resources would serve to protect paleontological resources. Alternative V would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal).

Fluid Minerals Management

The overall goal for fluid minerals management is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂) in the Monument. Under Alternative V, no direct impacts to cultural resource communities and sites would be allowed. New leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources and/or to protect against drainage in existing reservoirs under production. Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels on BLM-designated roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be included in COAs for new leases.

With the limited lease area and protective measures in place, little or no impacts to paleontological resources would be expected from fluid minerals management.

Rangeland Resources Management

Rangeland resources management actions for Alternative V would provide beneficial measures for paleontological resources. Livestock may have the most impact on fossils in the limited riparian areas where springs or streams cut into fossiliferous strata, or in overhangs and rock shelters. Reducing the number of AUMs, especially those with riparian areas, may reduce erosion.

Recreation and Transportation Management

Under Alternative V, recreation management would include a combination of strategies. Undeveloped areas with minimal facilities would be combined with destination management strategies for Painted Hand and Sand Canyon Pueblos, the AHC, and Lowry Pueblo RMZs. Approximately 7,875 acres would be managed as visitation areas, and 157,460 acres would be managed as backcountry areas. Up to 10 new SRPs would be issued. Rock climbing would be allowed in designated sites only.

Under this alternative, the Monument travel system would include 169 miles of roads (on 980 acres) for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, and/or dirt bike travel. These forms of travel would only be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Transportation and recreation management for Alternative V may result in potential adverse impacts to paleontological resources due to the increase in road mileage. Increased recreation and transportation opportunities may increase erosion as a result of more ground disturbance from a greater number of developed sites, as well as from new road development. The amount of paleontological resources potentially impacted would likely be very small. Expanding public access may increase the threat of vandalism and/or unauthorized fossil collecting.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (on 2,319 acres of rock outcrop where fossils may be present) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may result in beneficial impacts to paleontological resources.

4.2.5.3. Paleontological Resources Management Impact Comparison

The paleontological resource impact comparison is shown in Table 4-13. This table compares the consequences of resource management actions from each alternative on paleontological resources.

Paleontological resources are protected, in part, by all alternatives through the prohibition on recreational (non-permitted) collecting of fossils. However, rock and fossil enthusiasts have traditionally collected in the area. Overall, any increase in public access, livestock grazing, road development, and/or fluid minerals development may impact paleontological resources adversely due to vandalism and/or increased erosion. However, in addition to paleontological resources management, other resource management actions may minimize these adverse impacts by controlling public access through a variety of road designations, implementing protective stipulations and BMPs, and limiting the numbers of AUMs.

4.2.5.4. Cumulative Impacts

Mineral development on private lands within and around the Monument may result in cumulative impacts, including, increased erosion and fossil collecting associated with ground disturbance when additional well pads, pipelines, compressor stations, roads and/or other facilities are built. Mineral development on private land is not subject to the BLM BMPs or to other mitigation measures.

New wells would be drilled within existing leased areas in the Monument, which may result in 880 acres of disturbance. Existing stipulations would be enforced, including NGDs/NSOs that protect scenic, natural, cultural, and archaeological values, and that protect rare flora and fauna species habitats, where they apply. SSRs/CSUs would be established for surface disturbance on slopes greater than 40 percent, to protection of perennial water impoundments and streams, and to protect riparian/wetland vegetation zones. COAs would be included in all new leases. Additional restrictions would apply to geophysical operations.

Collecting fossils is not restricted on private land. Regionally, the area is known for its fossil resources and attracts collectors from around the world. As long as there is a commercial demand for these resources, pressure to collect and sell would continue.

Table 4-13 Comparison of Impacts to Paleontological Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Paleontological Resources	Prohibit recreational fossil collecting.	Prohibit recreational fossil collecting. Require clearances and/or mitigation.	Prohibit recreational fossil collecting. Require clearances and/or mitigation.	Prohibit recreational fossil collecting. Require clearances and/or mitigation.	Prohibit recreational fossil collecting. Require clearances and/or mitigation required.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Fluid Minerals	No Impact.	Make 880 new acres available for lease. Allow 2 new well pads; 1 mile of new road (with 18 total acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make 3,021 new acres available for lease. Allow 8 new well pads; 3 miles of new roads (with 73 total acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make 24,462 new acres available for lease. Allow 59 new well pads; 19 miles of new roads (with 447 total acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make 880 new acres available for lease. Allow 2 new well pads; 1 mile of new road (with 18 total acres of disturbance). Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs.
Recreation and Transportation	Manage 149 miles of roads (with 864 acres of disturbance). Develop 7 facilities.	Manage 139 miles of roads (with 806 acres of disturbance). Develop 7 facilities.	Manage 189 miles of roads (with 1,096 acres of disturbance). Develop 13 sites.	Manage 213 miles of roads (with 1,235 acres of disturbance). Develop 20 facilities.	Manage 169 miles of roads (with 980 acres of disturbance). Develop 11 facilities.

Table 4-13 Comparison of Impacts to Paleontological Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Other Resources: Soil Resources	Apply SSR/CSU to protect slopes greater than 40 percent (21,036 acres, with 1,899 acres of rock outcrop).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres, with 2,319 acres of rock outcrop).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres, with 2,319 acres of rock outcrop).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres, with 2,319 acres of rock outcrop).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres, with 2,319 acres of rock outcrop).

4.2.6. Soil Resources

The primary goal for soil resources in the Monument is to manage soil resources in a manner that sustains multiple-uses, and preserves and/or enhances existing ecological integrity and function. The management objectives related to this goal include:

- manage to ensure that the Public Land Health Standard for upland soils is met, or that significant progress is being made toward meeting this standard;
- manage uses to prevent damage to soil resources by protecting them from surface disturbance and by maintaining vegetation cover on slopes greater than 30 percent, as well as in other areas with high erosion potential; and
- manage soil resource to support other resource management objectives.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to soil resources.

Beneficial impacts to soil resources under the alternatives may include, but are not limited to, increased soil productivity and/or soil stabilization, increased plant and litter cover, and reduced soil disturbance. Adverse impacts to soil resources may include, but are not limited to, the removal of topsoil, loss of vegetative cover, disruption of soil stability, compaction, contamination, reduction of soil organic matter and soil productivity, reduction and/or loss of litter cover, and/or loss of diversity in plant communities.

Direct impacts to soil resources are typically caused by surface-disturbing actions that remove vegetative cover, loosen surface soil, result in compacted soil layers, and expose soil to wind and water erosion. Indirect impacts from soil disturbance may include, but are not limited to, reduced soil productivity, increased sedimentation, reduced infiltration, decreased air quality (as a result of wind erosion), and increased ground-surface runoff.

In general, the Colorado Public Land Health Standards and Guidelines for Livestock Grazing Management (BLM 1997) (Public Land Health Standards) and the livestock management actions delineated in the San Juan/San Miguel RMP ROD (BLM 1985) have guided management of the Monument's soil resources. In arid and semi-arid environments, livestock spend a disproportionate amount of time in riparian habitats; consequently, they concentrate much of their impacts on these ecosystems. Because soils are damp, compaction can easily occur. Impacts may affect riparian vegetation, stream morphology, and, eventually, water quality through increased erosion, compaction and/or streambank trampling. Livestock grazing impacts in upland areas may include, but are not limited to, reduced litter and/or vegetative cover, loss of native species that protect soil, and soil compaction. Once soil is exposed, both wind and water erosion may occur. Upland soils can wash downhill into dry, ephemeral canyon/gully systems and eventually reach major drainages.

Soil resources may be impacted by many management actions. Restricted access and prohibitions on ground-disturbing activities at, and near, cultural resources, along with soil stabilization in some areas, may result in beneficial impacts to soil resources. Managing for Public Land Health Standards and closing livestock grazing allotments may result in reduced erosion and, thus, in localized beneficial impacts. Fluid minerals management may directly impact soil resources as a result of ground-disturbing activities, including seismic operations and the construction of roads, well pads, pipelines, and/or other facilities. Recreation and transportation management may result in increased erosion as the number of roads increases; however, prohibitions on cross-country motorized and/or mechanized travel may result in

beneficial impacts. Fire may impact soil resources through the removal of plant cover, the destruction of surface organic matter, the alteration of soil temperature and moisture regimes (by altering the amount and type of plant overstory), the alteration in patterns of snow accumulation and snowmelt, and (if they are sufficiently hot) the modification of soil infiltration rates (by creating a hydrophobic or “water-repellent” surface soil). Benefits from cool surface fires may include the improvement of nutrient cycling (by releasing minerals from burned litter and duff), and the reduction of ground fuels that increase the potential for catastrophic wildfires.

Soil resource management actions include ground-disturbance restrictions on soil disturbances; reclamation activities tied to fluid minerals development; closure and/or rehabilitation of roads, and campsites; and intensive management of livestock, such as reduction in use, better distribution of livestock, and/or construction of livestock enclosures.

4.2.6.1. Evaluation Criteria and Assumptions

Although it is difficult to measure individual adverse impact components in relation to soil resources, the number of acres of ground disturbance can be used as a relative comparison factor under all of the alternatives. Estimates of disturbance were compiled from the AMS (BLM 2005b) and the RFD (BLM 2005c). The number of acres reclaimed or improved through increased vegetative cover and/or other methods of soil stabilization may be used to measure beneficial impacts. In some instances, when impacts cannot be quantified, a descriptive analysis is used.

Assumptions used in analyzing impacts to soil resources include the following:

- Erosion can be expected from the majority of soil types present in the Monument, most of which are characterized as having severe water erosion and high runoff properties.
- BMPs are required for all ground-disturbing activities.
- Approximately 3,078 acres, or 2 percent of Monument land, is rock outcrop and not subject to erosion.
- It is assumed that the number of roads predicted for construction, based on new acres leased for mineral development, would all be new roads.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Watersheds associated with the Monument were used as the cumulative impacts analysis area.

4.2.6.2. Alternative Analysis

Impacts to soil resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from management actions proposed for soil resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, recreation and transportation, and other resources.

Alternative I (No Action Alternative)

Soil Resources Management

Alternative I, the No Action Alternative, would continue current soil resource management activities. This includes reporting soil disturbing activities off Monument lands that are causing, or may cause, soil degradation, water-quality deterioration, and/or other damage to Monument

resources. Management actions for this alternative would include maintaining site-specific erosion control measures in Cultural Resource Management Plans, maintaining soil productivity, minimizing erosion, minimizing human-caused soil erosion in Emphasis Areas (A – Livestock Management, C – Recreation Resources, H – Public Land Disposal, and L – ACECs), and stabilizing and rehabilitating areas with severe human-caused soil erosion. However, based on current conditions and trends, Public Land Health Standards are not being achieved.

Under this alternative, a soil SSR/CSU requirement would apply for slopes greater than 40 percent, protecting approximately 21,036 acres. Short-term impacts would be allowed on mineral development sites (well pads, roads, etc.); however, operating plans would need to demonstrate how site productivity would be restored, how surface runoff would be controlled, and how offsite areas would be protected from accelerated erosion. Additionally, no surface-disturbing activities would be allowed during extended wet periods, and construction activities would be prohibited when soils are frozen.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect soil resources. This is because Alternative I would protect sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of cultural resource stabilization and excavation; however, techniques used to stabilize cultural resources typically stabilize erosive soils as well. More stabilization efforts would take place under this alternative than under any of the other alternatives. Impacts from cultural resource activities on soil resources may be isolated and short-term, with greater benefits realized over the long-term.

Fluid Minerals Management

Approximately 80 percent of Monument lands are currently leased for mineral development. The remaining 20 percent, under Alternative I, would not be leased; therefore, no new wells would be drilled. No new ground disturbance is anticipated as a result of this alternative because there would be no new fluid minerals leases.

Under this alternative, wells would continue to be drilled on existing leases. Existing stipulations would be enforced, including NSOs that protect scenic, natural, cultural, and archaeological values, and that protect rare flora and fauna habitats. TLs would be applied for big-game winter range. SSRs/CSUs would be established for surface disturbance on slopes greater than 40 percent, perennial water impoundments and streams, and riparian/wetland vegetation zones. Additional restrictions would apply to geophysical operations. No impacts are anticipated from fluid minerals management.

Rangeland Resources Management

A total of 8,492 active preference AUMs are currently permitted, with livestock grazing occurring on 95 percent of the Monument's 165,000 acres. Alternative I would continue this current level of use.

A Rangeland Health Evaluation and Ecological Site Inventory (BLM 2001i) were conducted in the Monument during summer 2001. The inventory identified 15 livestock grazing allotments, covering 141,000 acres, in need of intensive management (as described in the AMS, BLM 2005b). As part of this inventory, the condition of the upland soil, in many areas of the Monument, was generally considered "at risk with a reversible loss in productive capability and increased vulnerability to irreversible degradation." This condition is likely due to more than 100 years of heavy livestock grazing on Monument land (Horn 2004). There are currently 28 livestock grazing allotments in the Monument. Each allotment has been identified as: 1) having

achieved; 2) making progress toward achieving; or 3) having not achieved soil standards (although not every acre within a given allotment falls within a single category). Tallying acres for each category provides an overview of soil conditions within the Monument. Specifically, five grazing allotments have achieved upland soil standards (10,056 acres), one allotment is making progress toward achieving soil standards (247 acres), and 22 allotments have not achieved standards (149,393 acres).

The results of these evaluations indicate that managing for rangeland health under Alternative I (the No Action Alternative), has either not been successful or has been extremely slow in moving soil resources toward achieving Public Land Health Standards.

Recreation and Transportation Management

Under Alternative I, most existing user-created roads would be allowed to reclaim naturally or would be actively closed and reclaimed. Reclamation of roads would disturb soils on a temporary basis until vegetation became established. The transportation system would include 149 miles of roads, including 131 miles of roads open to the public for all forms of travel. No roads would be specifically designated for bicycle or OHV travel. A total of 864 acres may be disturbed as a result of roads for this alternative.

Other Resources Management

Under Alternative I, more than 95 percent of the Monument would remain classified as FMP C, with management strategies intended to ensure that wildland fire is contained within natural or human-made barriers/firebreaks. FMZ C areas have a lower suppression priority in multiple wildland fire situations than do FMZs A or B; however, the same goal of no more than 50 percent of the unit burning over a 10-year period applies. The remaining five percent of the Monument includes specific cultural resource, natural resource, and/or industrial infrastructure locations designated as FMP B or FMP A, under which fire management and mitigation strategies are more aggressive. Prescribed fires may be used as forest and vegetation management strategies in any FMZ.

Management of water resources under Alternative I would consist mainly of mitigation for disturbance to riparian corridors. Soil erosion is more likely to occur once disturbance has occurred, in spite of mitigation measures, than it would be if no disturbance occurred to begin with. The primary sources of soil erosion occurring in riparian areas are from road crossings and livestock grazing. This alternative targets the protection of 2,415 acres of riparian vegetation, and may result in beneficial impacts.

Alternative II

Soil Resources Management

Soil management activities are the same for Alternatives II through V. BMPs are mandatory as COAs for all new mineral leases and permits with NGD/NSO restrictions for areas with highly erosive soils and/or soils on slopes greater than 30 percent (36,504 acres), or soils with high-erosion potential. A zero-level accelerated erosion standard would be maintained, and rangeland use would not be allowed to reduce the protective attributes of vegetation. This is in order to bring attributes of vegetation to less than a Site Conservation Threshold (SCT), which is the kind, amount, and/or pattern of vegetation needed as a minimum on a given site to prevent accelerated erosion. This may help the Monument achieve Public Land Health Standards. This alternative actively manages soil resources through the stabilization and rehabilitation of eroded areas.

There is a high potential for soil erosion on oil and gas development sites, as well as in other areas where localized construction occurs. However, a NGD/NSO stipulation for slopes steeper

than 30 percent (36,504 acres) or other erosive soil may help reduce erosion. Additionally, soil erosion BMPs would be used during roads construction and/or other ground-disturbing activities, which may minimize impacts. There may be localized beneficial impacts from stabilization and restoration of eroded areas.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect soil resources. Alternative II would protect cultural resource communities, sites, and/or isolated finds from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of the development of 13 sites and from excavation; however, development would likely be isolated and short-term.

Fluid Minerals Management

Under the Proclamation, the overall goal for fluid minerals is to ensure the proper care and protection of the objects of the Monument prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂). In order to accomplish this, Alternative II allows for no direct impacts to cultural resource communities, sites, and/or to isolated finds. This would apply to both new and existing leases, and would provide a level of protection that greatly limits the amount of ground disturbance allowed. New leases would have NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources, and/or to protect against drainage in existing reservoirs under production. Under this alternative, up to 880 acres could be leased to protect against drainage. Even if additional lands were acquired, no more than 880 acres would be leased. A total of up to 18 acres of new ground disturbance is anticipated as a result of new fluid minerals leases.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels at BLM-defined roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on BLM-designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and soil BMPs would be included in COAs for new leases.

Rangeland Resources Management

Under Alternative II, rangeland would be managed to meet Public Land Health Standards. This alternative contains management actions that include closing the East and West Sand Canyon, Rock Creek, Goodman Gulch, and Trail Canyon allotments to grazing (6,059 acres), reducing the number of active AUMs to 6,437, limiting spring livestock grazing, fencing streams and riparian areas where other management actions do not result in achieving PFC and Public Land Health Standards, and considering “resting” allotments. Livestock grazing in the McElmo RNA (approximately 427 acres) would not be allowed.

As a result of reduced AUMs, the closing of five allotments, and other intensive livestock management measures, soil conditions under Alternative II may improve as a result of increased vegetative cover, reduced soil compaction, and reduced impacts in riparian areas. These improvements may occur more rapidly under this alternative than under other alternatives where livestock management is less restrictive (Alternatives I, III, IV).

Recreation and Transportation Management

The transportation network would include motorized, mechanized, and non-motorized roads. All roads in the Monument have a gravel or natural surface, except County Road 10, which is chip-sealed. The BLM roads provide public and administrative (agency and permittee) access to public lands and to inholdings of private land in the Monument.

Under Alternative II, the Monument would be closed to cross-country travel by motorized and mechanized vehicles to reduce inadvertent damage to cultural resources. Established roads, as shown on Map 5, would be open to designated uses. No upgrades (widening, passing lanes, and/or other surface upgrades) would be allowed. Administrative roads would be maintained at a minimum level. Most existing user-created roads would be closed and reclaimed. Closed roads would be reclaimed within 10 years.

Under this alternative, the transportation system would include 139 miles of roads, including 50 miles of roads open to the public for all forms of travel. There would be no roads specifically designated for bicycle or OHV travel. A total of 806 acres may be disturbed as a result of roads for this alternative.

Other Resources Management

Under Alternative II, the entire Monument would be designated as FMZ B, under which fire management and mitigation strategies are aggressive. Prescribed fires may be used as forest and vegetation management strategies. As a result of the reduction in the potential for soil erosion, this management may be beneficial to soil resources.

Water resources management under Alternative II is the most protective of soil resources, when compared to all of the other alternatives. This alternative would allow for the least amount of ground disturbance. This is because water resources management would consist of actively protecting canyon bottoms, riparian areas, and floodplains (5,312 acres). Because soil erosion is less likely to occur when ground disturbance is avoided, water resources management may result in beneficial impacts to soil resources.

Alternative III**Soil Resources Management**

Soil management activities are the same under Alternatives II through V. BMPs are mandatory as COAs for all new mineral leases and permits with NGD/NSO restrictions for areas with highly erosive soils and/or soils on slopes greater than 30 percent (36,504 acres). A zero-level accelerated erosion standard would be maintained, and rangeland use would not be allowed to reduce the protective attributes of vegetation. This alternative would actively manage soil resources through stabilization and rehabilitation. This alternative may be beneficial, may help reduce erosion, and may help the Monument achieve Public Land Health Standards.

There is a high potential for soil erosion on oil and gas development sites, as well as in other areas where localized construction occurs. However, a NGD/NSO stipulation for slopes steeper than 30 percent and/or for other erosive soil may help to reduce erosion. Additionally, soil erosion BMPs would be used during road construction and other ground-disturbing activities, which may minimize impacts. There may be localized beneficial impacts from the stabilization and restoration of eroded areas.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect soil resources. This is because Alternative III would protect cultural resource communities and sites from all activities except scientific, archaeological, and historical investigations (where surface disturbance is

required to be minimal). Some impacts may occur as a result of the development of 13 to 25 cultural resource sites, and from excavation; however, development would likely be isolated and short-term.

Fluid Minerals Management

Management of fluid minerals may directly impact soil resources as a result of seismic operations and other ground-disturbing activities, including the construction of roads, well pads, pipelines, and/or other facilities. Approximately 80 percent of Monument lands are currently leased.

Under the Proclamation, the overall goal for fluid minerals is to ensure the proper care and protection of the Monument objects prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂). Alternative III would allow no direct impacts to cultural resource communities and/or to sites. This would apply to both new and existing leases, and would provide a level of protection that greatly limits the amount of ground disturbance allowed. However, this alternative would allow for more ground disturbance than that allowed under Alternative II, because under this alternative isolated finds would not be protected. Up to 3,021 acres would be leased. A total of up to 73 acres of new ground disturbance is anticipated as a result of new fluid minerals leases.

Under this alternative, new leases would have NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed in existing McElmo Dome reservoirs currently under production. Geophysical operations would be permitted on BLM-authorized and/or user-developed roads, as authorized on a case-by-case basis. Alternative III would require that all vehicles associated with geophysical operations cross only on BLM-authorized roads. Seismic operations requiring bulldozers and/or other earthmoving equipment would be restricted to legally designated roads. Soil resource NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and soil BMPs would be included in COAs for new leases.

Rangeland Resources Management

Under Alternative III, rangeland would be managed to meet Public Land Health Standards. This alternative contains management actions that include closing the East and West Sand Canyon, Rock Creek, Goodman Gulch, and Trail Canyon allotments to grazing (6,059 acres); reducing the numbers of active AUMs to 8,368; limiting utilization levels; and restricting spring grazing. Livestock grazing in the McElmo RNA (approximately 420 acres) would be limited to winter months.

As a result of reduced AUMs and closing five allotments, soil conditions under Alternative III may improve as a result of increased vegetative cover, reduced soil compaction, and reduced impacts in riparian areas. Progress may be made toward achieving Public Land Health Standards. These improvements may be slower to occur than under Alternative II. Under Alternative III, AUM levels would be greater, utilization levels would not be reduced to the same extent as under Alternative II, and grazing would be allowed in the RNA. This may result in an adverse impact to the soil resource.

Recreation and Transportation Management

Under this alternative, the transportation network would include motorized, mechanized, and non-motorized roads. All roads in the Monument have a gravel or natural surface, except County Road 10, which is chip-sealed. The BLM roads provide public and administrative (agency and permittee) access to public lands and to inholdings of private land in the Monument.

Under Alternative III, the Monument would be closed to cross-country travel by motorized vehicles to reduce inadvertent damage to cultural resources. Established roads, as shown on Map 5, would be open to designated uses. No upgrades (widening, passing lanes, and/or other surface upgrades) would be allowed. Administrative roads would be maintained at a minimum level.

Under Alternative III, many existing user-created roads would be closed and reclaimed, while others would remain open. Closed roads would be reclaimed within 10 years. Reclamation of roads would disturb soils on a temporary basis until vegetation became established. The transportation system would include 189 miles of roads, including 60 miles of roads open to the public for all forms of travel. There would be roads designated for bicycle and/or OHV travel. A total of 1,096 acres of ground may be disturbed as a result of this alternative.

Other Resources Management

Wildland fire management under Alternative III would be focused on protecting cultural resources, improving forest and range health, and reducing risk of damage to private property, crucial habitats, watershed stability, and mineral facilities. Under Alternative III, the entire Monument would be designated as FMZ B, under which fire management and mitigation strategies are aggressive. Prescribed fires may be used as forest and vegetation management strategies. As a result of the reduction in the potential for soil erosion, this management may result in beneficial impacts to soil resources.

Water resources management under Alternative III would consist of actively protecting 5,312 acres of canyon bottoms, riparian areas, and floodplains. Due to the fact that soil erosion is less likely to occur when ground disturbance is avoided, water resources management may result in beneficial impacts to soil resources.

Alternative IV

Soil Resources Management

Soil management activities are the same under Alternatives II through V. Alternative IV management would include reporting activities on non-Monument lands that are causing, or may cause, soil degradation, water-quality deterioration, and/or other damage to Monument lands. Management actions for this alternative include maintaining site-specific erosion control measures in Cultural Resource Management Plans, maintaining soil productivity, minimizing erosion, and minimizing human-caused soil erosion. Soil resources management actions would include requiring soil BMPs as COAs for all new oil and gas leases and permits, establishing an NGD/NSO restriction for areas with slopes greater than 30 percent (36,504 acres) and/or for soils with high-erosion potential, maintaining a zero-level accelerated erosion standard, not allowing rangeland use to reduce the protective attributes of vegetation, identifying areas for stabilization and rehabilitation, beginning restoration, and stabilizing and rehabilitating areas with severe human-caused soil erosion.

NGD/NSO restrictions for slopes steeper than 30 percent and/or other erosive soils may help protect soil, but may not totally prevent erosion resulting from road and well pad construction and/or other from ground-disturbing activities. Short-term impacts may be allowed on mineral development sites (well pads, roads, etc.); however, operating plans would need to demonstrate how site productivity would be restored, how surface runoff would be controlled, and how offsite areas would be protected from accelerated erosion. Additionally, no surface-disturbing activities would be allowed during extended wet periods, and construction activities would be prohibited when soils are frozen. Due to the fact that erosion may be moderated through BMPs, NSO stipulations, and the zero tolerance policy, impacts may be beneficial to soil resources.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect soil resources. Alternative IV would protect cultural resource communities and sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of the development and stabilization of 13 to 25 cultural resource sites, and from excavation. Impacts from cultural resource activities on soil resources may be isolated and short-term, with greater benefits realized over the long-term.

Fluid Minerals Management

Management of fluid minerals may directly impact soil resources as a result of seismic operations and/or other ground-disturbing activities, including the construction of roads, well pads, pipelines, and/or other facilities. Approximately 80 percent of Monument lands are currently leased.

Under the Proclamation, the overall goal for fluid minerals is to ensure the proper care and protection of the objects of the Monument prior to authorizing continued exploration, development, production, and reclamation activity for fluid minerals (i.e., oil, gas, and CO₂). However, this alternative would allow for more ground disturbance than Alternative II. This is due to the fact that isolated finds are not protected under this alternative.

Up to 24,462 acres would be available for lease under Alternative IV. The BLM would expect that the majority of new wells would be drilled within or near existing producing areas. New leases would have NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. Geophysical operations would be permitted on BLM-authorized or user-developed roads. Seismic operations requiring bulldozers and/or other earthmoving equipment would be restricted to BLM-designated roads. Soil resource NSO stipulations for slopes greater than 30 percent would apply, and soil BMPs would be included in COAs for new leases. The number of acres of potential disturbance would be greater under this alternative than under any other alternative.

Rangeland Resources Management

A total of 8,492 active preference AUMs are currently permitted in the Monument, with livestock grazing occurring on 95 percent of the Monument's 165,000 acres. Alternative IV would continue this current level of use.

A Rangeland Health Evaluation and Ecological Site Inventory (BLM 2001i) were conducted in the Monument during summer 2001. As part of this inventory, the condition of the upland soil was generally considered "at risk with a reversible loss in productive capability and increased vulnerability to irreversible degradation." This condition is likely due to more than 100 years of heavy livestock grazing on Monument land (Horn 2004). There are currently 28 livestock grazing allotments within the Monument. Each allotment has been identified as: 1) having achieved; 2) making progress toward achieving; or 3) having not achieved soil standards (although not every acre within a given allotment falls within a single category). Tallying acres for each category gives us an over-view of soil conditions within the Monument. Specifically, five grazing allotments have achieved upland soil standards (10,056 acres), one allotment is making progress toward achieving standards (247 acres), and 22 allotments have not achieved standards (149,393 acres).

As summarized in the AMS (BLM 2005b), 15 livestock grazing allotments, covering 141,000 acres, are in need of intensive management. The results of these evaluations indicate that managing for Public Land Health Standards under the No Action Alternative (Alternative I) has either not been successful, or has been extremely slow in moving Monument soil resources

toward meeting Public Land Health Standards. Alternative IV requirements for livestock grazing are very similar to Alternative I. Some improvement may be seen as a result of adjusted spring grazing and utilization levels.

Recreation and Transportation Management

Under this alternative, the transportation network would include motorized, mechanized, and non-motorized roads. All roads in the Monument have a gravel or natural surface, except County Road 10, which is chip-sealed. The BLM roads provide public and administrative (agency and permittee) access to public lands and to inholdings of private land in the Monument. Reasonable access may be made available to persons engaged in valid uses, including movement of equipment and materials associated with oil and natural gas and CO₂ extraction.

Under Alternative IV, the Monument would be closed to cross-country travel by motorized vehicles to reduce inadvertent damage to cultural resources. Established roads, as shown on Map 5, would be open to designated uses. No widening or passing lanes would be constructed. Surface upgrades would be allowed for public safety and/or for the protection of Monument resources. Administrative roads would be maintained at a minimum level. Closed roads would be reclaimed.

Additional road construction for fluid minerals exploration and production may result in direct localized major, short-term adverse impacts. However, an NGD/NSO for slopes steeper than 30 percent and/or other erosive soil may help to protect the resource from erosion. Additionally, soil erosion BMPs would be used during road construction and/or during other ground-disturbing activities. There may be direct adverse impacts to soil resources from transportation management as a result of the construction of several new roads (see Map 5) and road improvements.

Under Alternative IV, most existing user-created roads would remain open. The transportation system would include 213 miles of roads, including 102 miles of roads open to the public for all forms of travel. There would be designated bicycle and/or OHV roads. A total of 1,235 acres of ground may be disturbed as a result of this alternative.

Other Resources Management

Under Alternative IV, the entire Monument would be designated as FMZ B, under which fire management and mitigation strategies are aggressive. Prescribed fires may be used as forest and vegetation management strategies. Fuels and fire management actions may result in beneficial impacts to soil resources.

Under Alternative IV, water resources management would consist of actively protecting 3,217 acres of riparian areas and floodplains. Because soil erosion is less likely to occur when ground disturbance is avoided, water resources management may result in beneficial impacts to soil resources.

Alternative V (Preferred Alternative)

Soil Resources Management

Soil resource management actions for Alternative V would include requiring soil BMPs as COAs for all new oil and gas leases and permits, establishing a NGD/NSO for areas with slopes greater than 30 percent (36,504 acres) and/or for soils with high-erosion potential, maintaining a zero-level accelerated erosion standard, not allowing rangeland use to reduce the protective attributes of vegetation, identifying areas for stabilization and rehabilitation, beginning restoration, and stabilizing and rehabilitating areas with severe human-caused soil erosion.

There is a high potential for soil erosion on oil and gas development sites, as well as in other areas where localized construction occurs. However, a NGD/NSO restriction for slopes steeper than 30 percent and/or other erosive soil may protect the resource from excessive erosion. Additionally, soil erosion BMPs would be used during road construction and during other ground-disturbing activities, which may minimize impacts. There may be localized beneficial impacts from the stabilization and restoration of eroded areas. Soil resources management may result in beneficial impacts, because erosion may be reduced and progress toward achieving Public Land Health Standards may be made.

Cultural Resources Management

Preservation of Monument cultural resources would serve to protect soil resources. Alternative V would protect cultural resource communities and sites from all activities, except scientific, archaeological, and historical investigations (where surface disturbance is required to be minimal). Some impacts may occur as a result of the development of 13 to 25 cultural resource sites, and from excavation. Impacts from cultural resource activities on soil resources may be isolated and short-term, with greater benefits realized over the long-term.

Fluid Minerals Management

Under Alternative V, up to 880 of the 24,462 acres available for leasing could be leased to protect against drainage. Even if additional lands were acquired, no more than 880 acres would be leased. A total of up to 18 acres of new ground disturbance is anticipated as a result of new fluid minerals leases. New leases would have NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. New leases would only be allowed for the purposes of promoting conservation of oil and gas resources and/or to protect against drainage in existing reservoirs under production.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. If water is present in washes, alluvial valleys, and/or in perennial water features, geophysical vehicles would only be allowed to cross channels at BLM-defined roads. Additionally, in areas where riparian vegetation is present, geophysical vehicles could only cross on legally designated roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NSO stipulations for slopes greater than 30 percent would apply, and soil BMPs would be included in COAs for new leases.

Rangeland Resources Management

Under Alternative V, rangeland would be managed to meet Public Land Health Standards. This alternative contains management actions that include closing the East and West Sand Canyon, Rock Creek, Goodman Gulch, and Trail Canyon allotments to grazing (6,059 acres), reducing the numbers of active AUMs to 6,437, limiting spring livestock grazing, fencing streams and riparian areas where other management actions do not result in achieving PFC and Public Land Health Standards, and considering "resting" allotments. Livestock grazing in the McElmo RNA (427 acres) would be limited to winter months.

As a result of the reduced AUMs and closing five allotments, soil conditions under Alternative V may improve as a result of increased vegetative cover, reduced soil compaction, and reduced impacts in riparian areas. These improvements may occur more rapidly in this alternative than under other alternatives where reductions in livestock impacts are not as prominent (Alternatives III and IV).

Recreation and Transportation Management

Under this alternative, the transportation network would include motorized, non-motorized, and mechanized roads. All roads in the Monument have a gravel or natural surface except County Road 10, which is chip-sealed. The BLM roads provide public and administrative (agency and permittee) access to public lands and to inholdings of private land in the Monument.

Under Alternative V, the Monument would be closed to cross-country travel by motorized and mechanized vehicles to reduce inadvertent damage to cultural resources. Established roads, as shown on Map 5, would be open to designated uses. No upgrades (widening, passing lanes, and/or other surface upgrades) would be allowed. Administrative roads would be maintained at a minimum level. Most user-created roads would be closed and reclaimed. Closed roads would be reclaimed within 10 years. Reclamation of roads would disturb soils on a temporary basis until vegetation became established. The transportation system would include 169 miles of roads, including 74 miles of roads open to the public for all forms of travel. There would be designated bicycle and/or OHV roads. A total of 980 acres of ground may be disturbed as a result of roads.

Other Resources Management

Under Alternative V, the entire Monument would be designated as FMZ B, under which fire management and mitigation strategies are aggressive. Prescribed fires may be used as forest and vegetation management strategies.

Water resources management under Alternative V would consist of actively protecting 5,312 acres of canyon bottoms, riparian areas, and floodplains. Due to the fact that soil erosion is less likely to occur when ground disturbance is avoided, water resources management may result in beneficial impacts to soil resources.

4.2.6.3. Soil Resources Management Impact Comparison

The soil resources impact comparison is presented in Table 4-14. This table compares the consequences of resource management actions under each alternative on soil resources.

4.2.6.4. Cumulative Impacts

There are three primary activities occurring offsite and adjacent to the Monument that may cumulatively impact soil resources. Historic and current livestock grazing on neighboring private lands are not required to operate under Public Land Health Standards; therefore, ground cover, plant diversity, and riparian health on these lands often do not meet Public Land Health Standards. Mineral development on existing leased lands within the Monument, as well as on private lands, may cause considerable ground disturbance when considering well pads, pipelines, compressor stations, roads, and/or other facilities. Mineral development on private land is not subject to BMPs or other mitigation measures. Reclamation of abandoned well pads has not been consistently successful. These areas continue to erode and provide conditions for the invasion of noxious weeds. Noxious weeds and other invasive species often prohibit the return of native vegetation, which is often better suited to hold soils in place. Urban expansion, and the associated construction of buildings and roads, is occurring throughout Montezuma and Dolores Counties, and is resulting in long-term ground disturbance. These activities may indirectly impact the Monument as a result of promoting offsite soil erosion that can then move onsite or down drainages during high intensity rainstorms and/or during snowmelt. Sediment may enter perennial streams (Yellow Jacket Canyon, McElmo Creek, and Cross Canyon) and may eventually be transported downstream from the Monument to the San Juan River (a major tributary of the Colorado River).

Table 4-14 Comparison of Impacts to Soil Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Soil Resources	Not meeting Public Land Health Standards. Apply no accelerated erosion standard. Apply SSR/CSU to protect slopes greater than 40 percent (21,036 acres).	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Apply zero-level accelerated erosion standard. Apply NGD/NSO stipulation to protect slopes steeper than 30 percent (36,504 acres).	Take specific actions to progress toward meeting Public Land Health Standards. Apply zero-level accelerated erosion standard. Apply NGD/NSO stipulation to protect slopes steeper than 30 percent (36,504 acres).	Take specific actions to progress toward meeting Public Land Health Standards. Apply zero-level accelerated erosion standard. Apply NGD/NSO stipulation to protect slopes steeper than 30 percent (36,504 acres).	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Apply zero-level accelerated erosion standard. Apply NGD/NSO stipulation to protect slopes steeper than 30 percent (36,504 acres).
Cultural Resources	Develop new sites for controlled visitation	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Fluid Minerals	No Impact.	Make 880 new acres available for lease (with up to 18 acres of new disturbance).	Make 3,021 new acres available for lease (with up to 73 acres of new disturbance).	Make 24,462 new acres available for lease (with up to 447 acres of new disturbance).	Make 880 new acres available for lease (with up to 18 acres of new disturbance).
Rangeland Resources	Not meeting Public Land Health Standards. Manage 28 allotments, 8,492 AUMs.	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Manage 23 allotments, 6,437 AUMs.	Take specific actions to progress toward meeting Public Land Health Standards. Manage 23 allotments, 8,368 AUMs.	Take specific actions to progress toward meeting Public Land Health Standards. Manage 28 allotments, 8,492 AUMs.	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Manage 23 allotments, 6,437 AUMs.

Table 4-14 Comparison of Impacts to Soil Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Recreation and Transportation	Manage 149 miles of roads (with 864 acres of disturbance).	Manage 139 miles of roads (with 806 acres of disturbance).	Manage 189 miles of roads (with 1,096 acres of disturbance).	Manage 213 miles of roads (with 1,235 acres of disturbance).	Manage 169 miles of roads (with 980 acres of disturbance).
Other Resources: Fuels and Fire	Manage 155,800 acres (95%) with no specific fire suppression requirements.	Manage entire Monument as FMZ B, with specific fire suppression requirements.	Manage entire Monument as FMZ B, with specific fire suppression requirements.	Manage entire Monument as FMZ B, with specific fire suppression requirements.	Manage entire Monument as FMZ B, with specific fire suppression requirements.
Other Resources: Water Resources	Protect 2,415 riparian acres.	Protect 5,312 acres of canyon bottoms, riparian, and floodplain.	Protect 5,312 acres of canyon bottoms, riparian, and floodplain.	Protect 3,217 acres of riparian and floodplain.	Protect 5,312 acres of canyon bottoms, riparian, and floodplain.

4.2.7. Terrestrial and Aquatic Wildlife

The primary goal for wildlife resources in the Monument is to optimize biological diversity by managing for a variety of healthy habitat types in support of native fish and wildlife populations. The management actions associated with this goal would aim to improve habitat conditions and reduce disturbance to terrestrial and aquatic resources (wildlife). The occurrence, abundance, and distribution of wildlife are most strongly affected by habitat type, quality, and accessibility. All of these habitat characteristics could be severely altered as a result of increased human activity and resource development to the detriment of wildlife. The management objectives related to this goal include:

- contribute to the maintenance or recovery of Federally listed threatened, endangered, proposed and candidate species; State listed species; and BLM sensitive species;
- contribute to the recovery of the Mexican spotted owl and the southwestern willow flycatchers (SWWF);
- protect nesting sites and winter concentration areas for bald and golden eagles;
- protect active nest sites for raptors other than Mexican spotted owls and eagles, and for bald and golden eagles;
- manage, conserve, and enhance habitat for neotropical migrant birds (which includes the SWWF) and sensitive reptiles;
- manage, conserve, and enhance habitat for sensitive reptile species;
- protect breeding habitat for amphibians;
- reintroduce bighorn sheep;
- restore sagebrush grasslands to support populations of Gunnison sage-grouse on their historical range;
- maintain and restore stable populations of BLM-sensitive fish species (flannelmouth sucker and bluehead sucker);
- improve tributaries that would contribute to restoring threatened and endangered fish populations within the San Juan River (Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker);
- improve forage and cover conditions for mule deer;
- manage and control wildlife species that have, or may have, detrimental impacts to other resources or land uses; and
- maintain and/or enhance habitats capable of sustaining existing or increasing wildlife and fish populations.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. Under all alternatives, the general management goal is to ensure against actions that would jeopardize population viability, particularly as it pertains to currently listed, proposed, or candidate threatened or endangered species or contribute to the listing of additional species.

Potential impacts to special status fish and wildlife fall into one or more of the categories described below, including habitat loss, habitat fragmentation, disturbance, interference with movement patterns, and direct mortality. These impacts may reduce the numbers of one or more species (potentially to the point of local extirpation), disrupt community composition and

function (through changes in the distribution, relative abundance, and habitat use of various species, in that reduced prey abundance may affect predator abundance), and make populations and communities overly vulnerable to other perturbations. For example, increases in roads may result in habitat fragmentation. This, in turn, may result in habitat-specialist species being more vulnerable to disturbance as a result of the reduction of patch size, an increase in the amount of edge, and an increase in accessibility to predators or nest parasitism by brown-headed cowbirds (in the case of songbirds). The gray vireo, the Mesa Verde nightsnake, and the six species of bats listed in Table 3-14 are species that depend on pinyon-juniper woodlands and, as a result, they may suffer adverse impacts from the fragmentation of this habitat resulting because the addition of roads.

As described above for general wildlife, impacts associated with changes in management, human use, and/or resource development may have direct and indirect impacts on special status species as well. For wide-ranging or migratory species, such as migratory songbirds, onsite impacts may also impact community composition and function in the southern portion of the species' range (where they overwinter). In addition, project impacts may combine with non-project impacts and result in cumulative impacts.

Although these impact categories are applied in a general sense to all special status species, including Federally listed, proposed, or candidate threatened or endangered species, interagency consultation with the USFWS, pursuant to Section 7 of the Endangered Species Act (ESA) would address potential adverse impacts on these species during the preparation of a Biological Assessment (BA) and the issuance of a Biological Opinion (BO) for the selected alternative. For the purposes of expediency, the analysis below addresses generalized impacts for all special status species as a group. Occasionally, when particular potential impacts are noteworthy, specific mention is made of one or more species.

The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to wildlife resources. Terrestrial and aquatic wildlife may benefit from resource management actions, including, protective measures for special status species, proactive implementation of a recovery plan, and public education. Other actions aimed at preserving and/or enhancing wildlife resources include TLs on disturbance activities during the breeding season and/or stipulations in buffer areas around certain wildlife species. Adverse impacts may include, but are not limited to, those resulting management actions, including fluid minerals development (as a result of ground disturbance, traffic, and human encroachment) or livestock management (as a result of vegetation being over utilized and riparian health being diminished).

Direct impacts to wildlife are often associated with direct mortality, including that which results from poaching or vehicle accidents. Broad-scale impacts, however, may occur indirectly, including those resulting from the loss or fragmentation of habitat, the disturbance of habitat security, and from movement patterns.

For the purpose of this analysis, short-term or temporary impacts are those that most often are associated with a period of initial habitat loss or modification and with intensive human activity. In the context of future management and development scenarios for the Monument, short-term impacts are mostly associated with oil and gas development, during which activity at a specific well site may last for several weeks or months. These impacts may be reduced in severity as that part of the field enters the production phase. This already occurs, to some extent, on existing fluid minerals leases.

Short-term impacts are those that last from five to ten years, or less. Long-term impacts are those that last longer than 10 years, with most of these extending throughout or potentially beyond the period of the management action or development activity. Examples include

impacts associated with the continued presence of elevated levels of human activity throughout the life of the oil and gas field (40 years or longer), as well as with the protracted period needed for final reclamation of disturbed areas. Permanent impacts are those with a likely duration of more than 50 years.

Major types of impacts on wildlife associated with humans are discussed below.

Direct Habitat Loss

Direct habitat loss occurs when required life-sustaining conditions are lost (e.g., through the removal of vegetation, the draining of pond). In terms of future land use and management actions, vegetation impacts may be the most significant. Removal of vegetation may impact wildlife, as a result of the reduction in the extent and/or quality of habitat (in terms of food, cover, and structure) for nesting as well as for other uses. By comparing the amount of habitat lost to the amount preserved, these impacts are relatively simple to quantify. For example, removal of vegetation during construction of a road or a well pad essentially strips the affected area of any wildlife value. Although the closure and reclamation of temporarily disturbed areas may eventually restore lost habitat values, the disturbance may have a long duration (20 or more years for a well) and/or require years or decades for recovery of pre-disturbance structure and function (e.g., pipeline corridors and reclaimed roads).

Habitat Modification

Changes in habitat are generally less obvious, and less severe, than losses of habitat; however, they may be significant. This is especially true if small impacts accumulate across large areas. Examples include the removal of forage by domestic livestock, the trampling of soil by domestic livestock, the invasion of weeds in areas where native plant vigor and/or cover is reduced, the chaining of pinyon-juniper woodlands, and/or the removal of tree cover during timber harvesting.

Habitat modification may also be beneficial and may serve as an important tool in wildlife management. Examples include the use of prescribed fires to stimulate new growth on senescent (older) woody vegetation, the thinning of overly dense shrubs to enhance forage production, the control of noxious weeds, the construction of protective fencing along riparian areas, and/or the creation of alternative watering features to reduce the need for cattle to access streams.

Habitat Fragmentation

This type of impact on wildlife is increasingly recognized as related to human population growth and associated development. Impacts of habitat fragmentation relate to the loss of large habitat blocks and to the increased percentage of “edge” on smaller blocks, when compared to larger blocks. Species adversely impacted by fragmentation consist of “habitat-interior” species and most “habitat-specialist” species. Habitat-interior species are those that breed in a particular habitat type, rather than at the transition area (ecotone) between two habitat types. Habitat-interior species are most often associated with dense forest vegetation types. In the Monument, the concern for habitat-interior species may apply to wildlife tied specifically to pinyon-juniper woodlands or to sagebrush shrublands. These vegetation communities, however, are naturally fragmented, and have a diverse mix of trees, shrubs, forbs, and grasses. Most species occupying these vegetation types are not there for the monoculture of a certain vegetation type, but rather for the diversity of the mix of vegetation type.

Roads may cause habitat fragmentation. Many species exhibit a decline in use of areas adjacent to roads. Habitat-interior birds may avoid habitat within 150 meters (less than a mile) of roads (Forman and Alexander 1998, Forman 2000, Ingelfinger 2001). In one study, use by mule deer was reduced within 200 meters of a road (the “road-effect zone” or the area over

which a road exerts its ecological influence, is 200 meters, or 0.125 mile) (Knight et al. 2000). Impacts have also been described in terms of road density (length of roads per unit area). Although research has demonstrated impacts of roads and road density, the density of roads in the Monument is far less than the thresholds discussed in the literature. In addition, use of roads varies, which alters the type and/or extent of impact on wildlife. For example, a seldom-used two-track dirt road (considered a tertiary, or secondary, road) may likely have less impact on wildlife than would a heavily traveled paved road (considered a primary road). The degree of disturbance may vary according to the type of road, the level of use, the mode of travel, the season of travel, and/or to the wildlife species being impacted.

Small mammals in sagebrush-steppe landscapes, like that occurring in the Monument, have been studied. Their species richness has decreased with the increasing isolation of habitat patches, and these sagebrush-obligate species may be at risk of extirpation as sagebrush becomes even more fragmented (Hanser and Huntly 2006). The presence of cheatgrass may further add to the decrease in diversity. Small mammals do not like to cross roadways, due to the lack of protective cover. Although roadways may sever populations of small mammals, roads in the Monument may be more likely to reduce movement, to a small degree. Some of the small mammal species with relatively limited distributions in Colorado that inhabit semi-desert shrubland, pinyon-juniper woodland, and/or grassland include the canyon mouse, the pinyon mouse, the northern grasshopper mouse, and the white-throated woodrat.

The size of an undisturbed block of land may also affect the number of bird species present. Larger habitat blocks (325 acres or more) support a vastly larger number of birds and have greater species diversity than do small blocks of 8 acres or less (McIntyre 1995). Although these studies were not conducted in pinyon-juniper woodlands, it is not unreasonable to assume that the same concept applies. Similarly, small mammals are sensitive to fragmentation in sagebrush shrublands (Hanser and Huntly 2006).

Disturbance

Disturbance impacts generally overlap with habitat fragmentation. This is due to the fact that many of the more common and important types of fragmentation (e.g., roads) also include increased levels of human activity. Although some species are more tolerant of human activity than others, virtually all species have some threshold of disturbance, above which they will abandon or avoid an area. The result is a de facto loss of habitat because avoided areas cannot meet survival needs. The amount of habitat actually available to wildlife is called "effective habitat", and reductions in the amount of effective habitat can greatly exceed any direct habitat loss. For example, Reed et al. (1996) estimated that the effective habitat loss of roads was 2.5 to 3.5 times as great as actual habitat loss. Construction of a mile-long straight road 30 feet wide (a typical width for an oil and gas access road) would represent 3.6 acres of direct habitat loss. Multiplying this figure by 3.5, (the upper end of the range reported by Reed) yields an effective habitat loss of approximately 23 acres per mile of road.

Roads are not the only cause of disturbance impacts. Archaeological excavation and outdoor recreation may also have impacts on wildlife (Knight and Gutzwiller 1995). Many more species may be adversely impacted due to hiking, camping, wildlife viewing/photography, OHV use, and/or rock climbing than were either unaffected or benefited (Boyle and Samson 1985). OHVs can cause flight, stress, and/or redistribution of wildlife. Humans hiking, backpacking, riding, and mountain biking may cause deer to move away at distances of 200 m (Freddy et al. 1986). Rock climbers may cause disturbance of preferred raptor perching and nesting sites. Mountain biking and OHV use have increased in the past two decades, a trend recognized in 1995 (Knight and Gutzwiller 1995), which may also result in disturbance impacts.

In terms of potential oil and gas development in currently undeveloped portions of the Monument, the degree of avoidance due to disturbance is difficult to predict because it would depend on the dispersion of disturbance areas, specific vehicular travel roads, and the number of trips. Wildlife would be expected to avoid buffer zones up to 0.5 mile around the individual areas of human activity, such as around well construction sites and main access roads, but they may continue to use the remaining available habitat. Construction disturbances may have a greater impact, although they may be temporary. Well-operating disturbances may likely be a lower-level disturbance and of longer term. Many species, including deer, can habituate to low levels of predictable human activity.

Interference with Movement Patterns

Habitat loss or modification, habitat fragmentation, and disturbance impacts may also impact wildlife by altering important daily or seasonal movement patterns. These patterns may be altered as a result of shifts to avoid human activity or to avoid crossing open areas that provide inadequate protective cover. In the Monument, large open areas remain relatively intact and there is likely little interference with wildlife movement patterns.

Direct Mortality

Direct mortality may result in areas experiencing increasing human use. This may be due to collisions with (or being run over by) vehicles, electrocution of raptors on utility lines, increased likelihood of illegal hunting, and/or inadvertent trampling of nests. The most likely cause of direct mortality in the Monument is roads. Amphibians and reptiles are particularly vulnerable to this because they cross roads between hibernation, breeding, and foraging sites; because they enjoy the warmth and stay on roads; and because they often do not move very quickly.

4.2.7.1. Evaluation Criteria and Assumptions

Although it is difficult to measure adverse impacts to individual fish or wildlife species or populations, the number of acres of ground disturbance, livestock numbers, and road density can be used to compare impacts to wildlife habitat among the alternatives. Management actions that result in protective measures for wildlife or wildlife habitat are considered beneficial impacts. Another factor considered when determining impacts from recreation on wildlife was visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, or during preparation for winter. Recreation strategies that promote visitation may likely result in greater impacts to wildlife. In some instances, when impacts cannot be quantified, a descriptive analysis is used.

Assumptions used in analyzing impacts to wildlife resources include the following:

- Application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E).
- For the impact analysis of oil and gas development, the BLM will follow the stipulations from the San Juan/San Miguel RMP ROD (BLM 1985) and Amendment (BLM 1991b), including standard restrictions and limitations that also provide a measure of protection.
- The number of roads predicted for construction, based on new acres leased for mineral development, would all be new roads.
- While a variety of scenarios for bighorn sheep reintroduction are presented in the alternatives, details are not known at this time. The Colorado Division of Wildlife (CDOW) is responsible for managing wildlife and, ultimately, for making the decision regarding wildlife reintroductions. Given these circumstances, analysis at the

DRMP/DEIS level can only focus in the Monument's willingness to coordinate with the CDOW throughout the process.

- While special status species are discussed below, potential impacts to general fish and wildlife can also be considered as potential impacts to special status species.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Watersheds associated with the Monument were used as the cumulative impacts analysis area.

4.2.7.2. Alternative Analysis

Impacts to wildlife resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions proposed for wildlife resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Wildlife Management

Protective measures, such as TLs and stipulations for wildlife in general, may also benefit special status species. A number of existing protective measures would be in place under Alternative I. These are listed in the San Juan/San Miguel RMP ROD (BLM 1985) and include the prohibition of activities that would result in direct harm to threatened and endangered or sensitive species; the application of seasonal restrictions, where appropriate; the development of Habitat Management Plans (HMPs); the maintenance of riparian habitat; the evaluation of potential native fish reintroductions; and the maintenance of deer and elk habitat and herd size management. Other actions target special status species and include:

- provide inventories of special status species in association with public land disposal;
- manage important habitat for special status species in ACECs;
- invest funds for habitat improvements in Cross, Cow, Cahone, Hovenweep, and Bridge Canyons riparian areas;
- apply seasonal restrictions, where appropriate;
- develop habitat management plans, especially for special status species;
- maintain or improve riparian habitat; and
- evaluate potential native fish reintroductions.

All of these actions may serve to protect wildlife; therefore, Alternative I may provide benefits for wildlife and special status species.

This alternative calls for the modification of agreements with Wildlife Services, a section of the USDA Animal and Plant Health Inspection Service (APHIS), to specify conditions for predator control. However, this alternative is not specific as to what those modifications may be; therefore, impacts cannot be determined.

Cultural Resources Management

The strategy for managing cultural resources over most of the Monument is called the “outdoor-museum” concept, in which visitors make their own discoveries of the nearly 30,000 cultural sites. Under this alternative, sites are being assessed, and new sites are being developed for controlled visitation. This alternative allows for 240 sites to be stabilized and in some cases developed. The additional access and greater level of overall visitor use that could result from cultural resource development may have adverse impacts, especially if songbirds are breeding and/or deer are wintering in the same areas. Impacts may be localized at developed sites because this is where individuals and large groups would be directed. The impacts on special status species may depend on the location of their habitat, especially during times of occupancy, in relation to developed sites. Under this alternative, scientific excavation would be timed to avoid special status species impacts. The impact on special status species as a result of visitations to these cultural sites may be expected to be minimal. This is because visitation is not heavy, because there are currently very few developed sites, and because restrictions can be administered to avoid conflicts (i.e., site closure).

Fluid Minerals Management

A large portion of the Monument is currently leased for oil and gas development (334 leases). The Proclamation allows for continued development on existing leases. However, no new leases would be issued under this alternative; therefore, no new acres would be disturbed. Stipulations in place from the San Juan/San Miguel RMP/ROD Amendment (1991a) include NSO stipulations on areas of natural value and Bridge Canyon RNA (for rare flora and fauna); TLs on big-game crucial winter ranges (December 1 through April 30); and SSR/CSU stipulations on slopes equal to, or greater than, 40 percent and on riparian vegetation. TLs may reduce impact to big game while they occupy crucial winter habitat. Stipulations also apply to the McElmo RNA, for the habitat protection for rare species and reptiles, in particular.

For areas currently leased, the drainages and canyons may likely be protected from mineral development, due to their lack of easy access and to the SSRs/CSUs on riparian vegetation and steep slopes. It is anticipated that most of the extraction activity would occur on the mesa tops above the canyons, and that those species favoring riparian areas and canyons may not be disturbed. However, those species favoring upland communities, such as pinyon-juniper woodlands, sagebrush and saltbush shrubland, and shrub-grasslands, may be impacted. The longnose leopard lizard, a BLM sensitive species, is an example of a species favoring these upland areas. These impacts are ongoing, based on current management of fluid minerals within existing leases in the Monument.

Although fluid minerals development has many aspects that are detrimental to wildlife populations, it is often the associated transportation infrastructure that causes disturbance, interference with movement, and/or habitat fragmentation. These are discussed below, under Recreation and Transportation Management. In addition, the use of roads may bring more people to otherwise isolated areas, along with associated human disturbances. Examples include an increase in recreational shooting (in areas that often include nearby wildlife), and an increase in recreational use by cyclists and OHV-users that occur when roads open up in otherwise inaccessible area (Reeve and Vosburgh 2006).

Alternative I would adhere to the San Juan/San Miguel RMP ROD (BLM 1985) and 1991 Amendment (BLM 1991a), which specify that no activities would be permitted in special status species’ habitat that would jeopardize their continued existence. Alternative I also specifies that habitat management plans may be developed for winter raptor concentration areas and for threatened and endangered species’ habitat, with a priority on the latter. Stipulations that are

appended to fluid minerals leases include protection of natural resources (Stipulation Code SJ-1) and of rare fauna in Bridge Canyon (McElmo) RNA (Stipulation Code: SJ-4).

Rangeland Resources Management

Under Alternative I, 28 allotments would be available for livestock grazing, with 8,492 active preference AUMs. Rangeland monitoring would continue to occur in order to determine whether or not livestock grazing goals and objectives were being obtained. During critical livestock grazing periods, less than 30 percent of active preference and less than 50 percent utilization of current year growth of key species would be allowed. Spring livestock grazing in all allotments would not occur on native ranges during the critical period of early forage growth, unless a system is implemented that would provide a critical rest period every 3 years. Alternative I would have the largest number of allotments and active AUMs and, in that regard, is most similar to Alternative IV. Although meeting Public Land Health Standards and Livestock Grazing Guidelines is required under Alternative I (the No Action Alternative), current conditions indicate that, to date, standards have not been met.

Livestock grazing impacts to wildlife under this alternative may include loss of forage and/or impacts to riparian habitats favored by many species of wildlife. Livestock grazing may lead to conversion of native vegetation to invasive weeds, such as to cheatgrass. Due to the limitation of current noxious weed management, noxious weed populations may be expected to increase in frequency, density, and diversity under this alternative. This may have the potential to impact special status species, especially the longnose leopard lizard. Dense stands of cheatgrass under sagebrush and semi-desert shrublands may adversely impact longnose leopard lizards. This is because dense grass hinders their ability to find prey (Hammerson 1999).

Alternative I does not contain any active steps for the protection of riparian systems, biological crust communities, or stubble height. Livestock grazing impacts to special status species under this alternative may be potentially severe and may include habitat alteration of native sagebrush shrublands, which may, in turn, result in adverse impacts to the special status species that use these native habitats, such as the ferruginous hawk, the burrowing owl, and the longnose leopard lizard. Any impacts to riparian vegetation from weed infestations may also be serious due to the potential for damage to the riparian community (which supports a variety of Neotropical migrant small birds, as well as raptors and other species). Of particular concern would be impacts to riparian vegetation that may impact instream habitat quality (e.g., decreased bank stability, decreased vegetation cover, and/or increased sedimentation) in reaches that support flannelmouth suckers and bluehead suckers. Impacts to riparian habitats that result in habitat alteration may also impact potential habitat for the western yellow-billed cuckoo and the SWWF (species that depend on well-developed riparian vegetation).

Recreation and Transportation Management

A primary factor to consider when determining impacts from recreation on wildlife is visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, and/or during preparation for winter. Recreation strategies that promote visitation may likely result in greater impacts to wildlife; however, this alternative has no promotion strategy and would only develop facilities on an as-needed basis.

Based on projected regional population growth and the increasing popularity of outdoor recreation, recreation use continues to grow (Knight and Gutzwiller 1995). The resulting potential for damage to vegetation and the potential for increased disturbance of wildlife may likely increase the size and severity of road-effect zones along commonly used roads. This may reduce effective or secure habitat for wildlife, increase habitat fragmentation, and potentially disrupt important movement patterns.

As discussed earlier, roads result in direct habitat loss, habitat fragmentation, spread of noxious weeds, disturbance, interference with movement patterns, and direct mortality. There are two measures of transportation that can be evaluated, these are: 1) road length, and its associated area of ground disturbance; and 2) road density involving the number of miles of roads per square mile. Although there are numerous variables to consider when determining impacts, the comparison of road length and density under the five different alternatives may be used as a comparison, and is presented in Table 4-1.

The total length of roads for this alternative would be 149 miles. Road density is relatively low (0.58 miles per square mile), and the literature does not report reduced usage by elk and deer at these low densities, other than the avoidance of roads in general. Many of these roads are likely used for OHV recreation and, although narrow, represent potentially severe disturbance due to noise, dust, speed, and the potential of users to travel onto adjacent off-road lands. Due to the length of roads that would be added for this alternative, habitat fragmentation remains small, and large blocks of undisturbed land, including designated WSAs, would be maintained. Direct habitat loss from ground disturbance from the transportation system proposed under this alternative is 864 acres.

Other Resources Management

Perhaps the most important resource for wildlife, particularly in arid regions, is water. Riparian and wetland areas show the greatest diversity in vegetation and wildlife species. Alternative I protects 2,415 acres of riparian system; however, there are no restrictions on groundwater and new water developments. Of the five alternatives, Alternative I is the least protective of water resources.

This alternative would also protect large blocks of land, which may benefit wildlife. In particular, 25,549 acres would be managed as WSAs, and 427 acres would be managed as an RNA.

Alternative II

Wildlife Management

Several strict protective measures would exist for wildlife under Alternative II, and would include the following:

- TLs implemented under this alternative for special status species may benefit wildlife in general;
- the prohibition on ground-disturbing activity during the raptor breeding season may benefit several bird species;
- the avoidance of vegetation removal or treatment from mid-April to mid-July may protect nesting migratory birds and other wildlife;
- predator control would prohibit APHIS from culling or shooting individual animals or destroying their dens, except when individual animals pose a safety risk to humans or to for specific reasons, as agreed upon ahead of time;
- the protection or improvement of habitat through:
 - the establishment of native grasses and forbs;
 - the maintenance or improvement of habitat;
 - the prohibition of ground-disturbance activities within 150 feet of bodies of water that support native amphibian breeding;
 - the consideration of habitat management for deer;

- prescribed fires;
- changes in livestock grazing; and
- the implementation of weed control and revegetation.

These actions may provide greater benefit to wildlife than those delineated under Alternative I.

Alternative II would allow the beneficial measures for special status species outlined in Alternative I, and would add the following:

- the establishment of a TL within 0.5 mile of documented (occupied or historic) Mexican Spotted Owl nests in order to prohibit ground-disturbing activities within 0.5 mile from March 15 to September 1, with permitted activities within this area limited to mesa tops and rims;
- the establishment of a 0.5-mile restriction from any active bald eagle or golden eagle nests from March 1 through July 15, and from winter roost or concentration areas from November 16 through April 15;
- the prohibition of ground-disturbing activities within 0.5 mile of bald or golden eagle nests site, or bald eagle winter roost sites (active or historic), with a lease notice for oil and gas activities;
- the prohibition of tree removal and/or ground-disturbing activity during the raptor nesting season from March 1 through July 15;
- the implementation of recovery actions for the SWWF;
- the preparation of a HMP for sensitive lizard species;
- the prioritization of the management of cheatgrass and other noxious weeds in vegetation communities that support sensitive reptiles and reestablishment of native vegetation;
- the fencing of suitable SWWF habitat to exclude livestock grazing; and
- the establishment of an NGD/NSO restriction within SWWF habitat, and a 0.25-mile buffer of habitat patches, which would disallow any activities that may result in ground disturbances.

Based on its proactive plans for recovery; its numerous stipulations relating to timing, ground disturbance, and buffer zones; its requirement for the creation of HMPs for sensitive lizard species; and its prioritization of weed management in habitats with a high potential to support sensitive reptile species, this alternative may result in a large amount of protection for special status species. These measures may protect habitat; reduce disturbance; and reduce habitat alteration and fragmentation for bald eagles, ferruginous hawks, burrowing owls, both species of lizard, common kingsnakes, and Mesa Verde nightsnakes.

Cultural Resources Management

Under Alternative II, 13 sites would be developed for public use. Development of each site, and the attendant studies and visitor presence, may represent a small footprint in the Monument. The additional access and greater level of overall visitor use may have adverse impacts on wildlife, particularly during sensitive times of the year (i.e., during breeding and wintering). Considering the relatively small surface area involved, it would most likely be a minor impact. Where special status-species habitat occurs within the vicinity of developed sites, disturbance to their habitat would be avoided. If a special status species were present, protective measures would be in place to avoid impacts while they occupy the site. Protecting cultural resources,

including communities, sites, and isolated finds, may help to protect large blocks of wildlife habitat from ground disturbance. Given these mitigation measures, adverse impacts to special status species may be minimal under Alternative II.

Fluid Minerals Management

Under Alternative II, new fluid minerals leases would be allowed on up to 880 acres over the next 20 years in order to protect against drainage of fluid minerals. NSO stipulations would be included for areas of cultural and natural value. An environmental assessment (EA) or an EIS would be required for seismic operations. Geophysical operations could only use BLM-defined roads, and would have to avoid biological crust communities.

With the potential for new leases limited to up to 880 acres, there may be surface disturbances totaling up to 18 acres for well pads, associated structures, and for access roads. This would cover a relatively small portion of the Monument, and would be mitigated by the NGD/NSO stipulations associated with it.

Much of the Monument is available to fluid minerals development under existing leases. For areas currently leased, the drainages and canyons may likely be protected from mineral development due to their lack of easy access and to the SSRs/CSUs on riparian vegetation and steep slopes. It is anticipated that most of the extraction activity would occur on the mesa tops above the canyons, and that those species favoring riparian areas and canyons may not be disturbed. However, those species favoring pinyon-juniper woodlands, sagebrush and saltbush shrubland, and shrub-grass communities, may be impacted. The longnose leopard lizard, a BLM sensitive species, is an example of a species favoring these upland areas. These impacts are ongoing, based on current management of fluid minerals within existing leases in the Monument. The NGD/NSO for the protection of cultural resources under this alternative may also reduce the potential for impacts to wildlife. Protecting cultural resources at the landscape level, including communities, sites, and isolated finds, may help to protect large blocks of habitat from ground disturbance. This action, along with the protection of canyon bottoms, riparian areas and flood plains planned under this alternative, may provide large areas of undisturbed habitat for wildlife.

Rangeland Resources Management

Under Alternative II, 23 allotments would be available for livestock grazing, which would encompass 157,941 acres. There would be 6,437 active AUMs and five livestock grazing allotments would be closed (124 AUMs), including Sand Canyon East, Sand Canyon West, Rock Creek, Goodman Gulch, and Trail Canyon allotments. These allotments occur in the southeastern part of the Monument and total 6,059 acres.

Monitoring for Public Land Health Standards would continue, and goals may be achieved expeditiously as the result of reducing authorized allotment use, adjusting spring livestock grazing duration and extent of use, and implementing a rest-rotation grazing system. Permittees and interested public would be invited to participate in monitoring. Existing grazing permits would be reviewed on a regular schedule and revised, as necessary, to address current allotment conditions and permittee needs in the context of achieving Public Land Health Standards and other resource management objectives.

The impact of livestock grazing under Alternative II may have the least impact of all of the alternatives. This is because it has the lowest number of allowed allotments and AUMs. This may reduce competition for forage and may minimize impacts on riparian vegetation, leaving more native vegetation communities intact.

Recreation and Transportation Management

A primary factor to consider when determining impacts from recreation on wildlife is visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, and/or during preparation for winter. Recreation strategies that promote visitation may likely result in greater impacts to wildlife. This alternative would promote an undeveloped recreation strategy with minimum facilities. The target visitation for this alternative is local residents and incidental visitors. This marketing strategy would maintain use at its lowest level, and would be the most protective of special status species.

There would be a total of 139 miles of roads designated under this alternative. Road density would be 0.54 miles per square mile, representing a reduction from Alternative I, in terms of the potential for disturbance, habitat fragmentation, and/or loss of habitat security. Out of all of the alternatives, this alternative may provide the greatest benefit to wildlife. Direct habitat loss from ground disturbance from the transportation system proposed under this alternative is 806 acres.

Other Resources Management

Perhaps the most important resource for wildlife, particularly in arid regions, is water. Riparian and wetland areas show the greatest diversity in vegetation and wildlife species. Alternative II protects 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Under this alternative, groundwater and new water developments would be discouraged. This alternative, along with Alternative V, is the most protective of water resources and, consequently, of wildlife.

This alternative would maximize the protection of large blocks of land for a variety of resource purposes; therefore, it may result in the most benefits for wildlife. In particular, 25,549 acres would be managed as WSAs, 5,223 acres would be managed for wilderness character, and 7,826 acres would be managed as RNAs.

Alternative III**Wildlife Management**

For wildlife in general, management under Alternative III would be very similar to that proposed under Alternative II, except for a few less restrictive protective measures. Predator control may limit techniques and uses in specifically designated areas, rather than Monument-wide. For special status species in general, the management strategy for Alternative III would be very similar to Alternative II. One beneficial difference in Alternative III would be the incorporation of a TL for activities within 0.25 mile of SWWF habitat, which may benefit this special status species if, or when, it is located in the Monument.

Cultural Resources Management

Alternative III would allow for the development of 13 to 25 sites for public access and interpretation. The additional access and greater level of overall visitor use may have adverse impacts on wildlife, especially during sensitive times of the year (i.e., during breeding and wintering). For example, adverse impacts on special status species may occur should promotion of a site coincide with species occupancy. However, due to the fact that there would only be a few, if any, of these locations, sites could be closed to avoid impacts, and scientific excavation could be timed to avoid special status species. Impacts may likely be minimal or non-existent. Protection of cultural resource communities and sites may assist in protecting large blocks of wildlife habitat from ground disturbance.

Fluid Minerals Management

Alternative III would make up to an additional 3,021 acres available for new fluid minerals leasing. Associated with this potential development would be up to an additional 73 acres of access road, well pad, and associated structures. Some activities that differ from Alternative II that may disturb and/or displace wildlife, especially special status species, include:

- not protecting against disturbance on the basis of isolated cultural resource finds;
- less stringent requirements for the coverage of cultural resource inventories;
- geophysical operations permitted on illegal roads, as authorized on a case-by-case basis;
- new leases in the McElmo Dome Unit;
- use of earthmoving equipment for maintenance and repair during seismic operation-related work; and
- use of explosives 500 feet away from cultural resource sites with 20- to 40-pound charges.

Under Alternative III, fluid minerals management may result in adverse impacts to wildlife due to its less stringent restrictions on development activities.

Rangeland Resources Management

The number of AUMs allowed under Alternative III (8,368) may be less than the No Action Alternative (Alternative I) by 124 AUMs, which is accounted for by closing five allotments. This alternative may reduce livestock competition with wildlife for forage and may reduce the use of riparian areas in those five allotments. Removing livestock grazing from these areas in the southeastern part of the Monument may benefit the longnose leopard lizard, where it is known to occur.

This alternative maintains the same number of AUMs on all allotments as that proposed under Alternative I, except for allotments planned for closing. Due to the fact that the No Action Alternative (Alternative I) has shown little progress in achieving Public Land Health Standards, this alternative may also show little progress. Utilization and seasonal grazing restrictions may help to move rangelands toward standards; however, it would likely be at a slower pace than under Alternatives II and V.

Recreation and Transportation Management

A primary factor to consider when determining impacts from recreation to wildlife is visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, and/or during preparation for winter. Recreation strategies that promote visitation may likely result in greater impacts to wildlife. This alternative would promote a recreation destination strategy for regional visitors, along with appropriate support facilities.

Transportation activities outlined in Alternative III that may impact wildlife include the enlargement of parking areas, the potential upgrading of travel surfaces, the lack of a timetable for road-closure strategy and enforcement of a transportation management system, and the increase in road miles and density. This alternative would include 189 miles of roads, with a road density of 0.73 miles per square mile. Roads have a major impact on wildlife, and these increases may result in direct habitat loss (1,096 acres), habitat fragmentation, interference with movement patterns, spread of noxious weeds, and direct disturbance and mortality.

Other Resources Management

Perhaps the most important resource for wildlife, particularly in arid regions, is water. Riparian and wetland areas show the greatest diversity in vegetation and wildlife species. Alternative III would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Under this alternative, groundwater and new water developments would be allowed. These management actions may not be as beneficial as those proposed under Alternative II.

This alternative would protect large blocks of land, which may benefit wildlife. In particular, 25,549 acres would be managed as WSAs, and 427 acres would be managed as RNA. Fewer acres of special designation areas are protected under this alternative.

Alternative IV**Wildlife Management**

This alternative provides the least protective measures for wildlife of all of the action alternatives. Under Alternative IV, there would be no protection for amphibian breeding habitat from ground-disturbing activities. Some vegetation treatment for forage improvement would be allowed, but would not be promoted as much as under some of the other alternatives. Modification of agreements with Wildlife Services to specify conditions for predator control would be made. However, this alternative is not specific as to what those modifications may be. This alternative would provide only some of the benefits to wildlife that Alternatives II, III, and V would provide.

The only difference for special status species under this alternative is that USFWS-approved SWWF surveys would be conducted for activities within 0.25 mile of nesting habitat. If birds are found, then TLs would apply for the breeding season. This differs from Alternative III, under which there would be a TL for activities within 0.25 mile during the breeding season. Protective measures for Mexican spotted owls, bald eagles, SWWF habitat, and roundtail chubs would be in place under this alternative.

Cultural Resources Management

Alternative IV would allow for the development of 13 to 25 sites for public access and interpretation. Stabilization of cultural resource sites would be emphasized. The additional access and greater level of overall visitor use may have adverse impacts on wildlife. The development of additional sites for public access and interpretation may have adverse impacts on special status species, especially if promotion of a site coincides with special status species habitat primarily during occupancy. However, due to the fact that there would only be a few, if any, of these locations, sites could be closed to avoid impacts, and scientific excavation could be timed to avoid special status species impacts. Impacts may be minimal or non-existent. Protection of cultural resource communities and sites may assist in protecting wildlife habitat from ground disturbance.

Fluid Minerals Management

Alternative IV would make up to 24,462 acres available for new-fluid minerals development, including up to 12 new oil and gas wells, and up to 38 new CO₂ wells. Associated with this development would be up to an additional 447 acres of ground disturbance, as a result of access road, well pad, and associated structure development. Alternative IV would allow increased activity over that proposed under Alternative III, including the following:

- the distance between explosives and cultural resources would be determined on a case-by-case basis;

- geophysical operations would be allowed throughout the Monument, with authorization on a case-by-case basis;
- limitations on disturbance to biological crust communities would not be specified; and
- passage through washes, alluvial valleys, and/or through perennial water features with riparian vegetation would have fewer restrictions.

In addition, the only NGD/NSO stipulations would be on areas of natural value and for slopes greater than 30 percent. There would be no TLs on crucial winter range. Fluid minerals development may have significant impacts on special status species, and their habitat, if development occurred in, or immediately adjacent to, suitable habitat, especially during occupation.

If the Squaw-Cross Canyons area were to be leased, there may be an impact to elk and mule deer due to the fact that this is part of the winter range for both species (see Map 11). The deer and elk in the Monument are part of Game Management Unit (GMU) 72. This is a very large unit, encompassing the western half of Montezuma County and the southwestern portion of Dolores County. Winter range is crucial habitat for these ungulates, because winter is their most vulnerable time of year. Impacts to winter range may impact herd numbers. In the Monument, mule deer winter range is approximately 24,307 acres and elk winter range is approximately 17,553 acres; this is 13 percent and 9.5 percent of the entire Monument, respectively. The greatest protection afforded wildlife in the Squaw-Cross Canyon area, under this alternative, would be the maintenance of much of the area as a WSA.

Rangeland Resources Management

Under Alternative IV, 28 allotments and 8,492 active AUMs would be available for livestock grazing, the same as under current management. Under Alternative IV, the remaining acres outside of designated livestock grazing allotments capable of supporting livestock grazing would be allocated. As with all of the alternatives, Alternative IV would require compliance with Public Land Health Standards and Livestock Grazing Guidelines. However, this alternative would maintain the same number of AUMs on all allotments as would Alternative I. Due to the fact that the No Action Alternative (Alternative I) has shown little progress in achieving Public Land Health Standards, this alternative may also show little progress. Progress may be made through utilization and seasonal grazing restrictions; however, it may occur at a slower pace than under Alternatives II and V. Compared with Alternative I, Alternative IV would address forage utilization levels, and would be protective of riparian systems and stubble height.

Compared with Alternative I, Alternative IV would establish minimum stubble height standards; require fencing of riparian areas, where needed, to achieve PFC and Public Land Health Standards; require coordination with the CDOW; and require protection of biological crusts – all actions that may be beneficial to wildlife and special status species. Alternative IV would place no restrictions on livestock grazing in the McElmo Dome Unit, whereas Alternative I would require intensive livestock management. Unlike Alternative III, there would be no removal of livestock grazing from five southeastern allotments. Although there would be some improvements in management compared with Alternative I, overall livestock grazing under Alternative IV may result in impacts to special status species, in the form of habitat modification, due to a reduction in native vegetation.

Recreation and Transportation Management

A primary factor to consider when determining impacts from recreation on wildlife is visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, and/or during in preparation for winter. Recreation strategies that

promote visitation may result in greater impacts to wildlife. This alternative would promote a recreation destination strategy for national and international visitors, and would have a greater need for facility development.

Many of the potential impacts listed for Alternative III may also occur under Alternative IV. In addition, Alternative IV would include the enlargement of parking areas, potential upgrades to travel surfaces, lack of a timetable for road closure strategies and enforcement of a transportation management system, and an increase in road miles and density. Alternative IV would increase the length of roads to 213 miles, and a road density of 0.83 miles per square mile. Roads can have a major impact on wildlife, and these increases may result in direct habitat loss (1,235 acres), habitat fragmentation, interference with movement patterns, spread of noxious weeds, disturbance, and direct mortality.

Other Resources Management

Perhaps the most important resource for wildlife, particularly in arid regions, is water. Riparian and wetland areas show the greatest diversity in vegetation and wildlife species. Alternative IV protects 3,217 acres of riparian system, including riparian areas and floodplains (not canyon bottoms). Under this alternative, groundwater and new water developments would be encouraged to support expanded resource development.

This alternative would protect large blocks of land, which may benefit wildlife. In particular, 25,549 acres would be managed as WSAs, and 427 acres would be managed as RNA. Although protective, less protection would be afforded special designation areas than those proposed under Alternative II.

Alternative V (Preferred Alternative)

Wildlife Management

Alternative V is similar to Alternative II, in terms of wildlife management, with the following actions:

- TLs would be implemented for special status species that may also benefit wildlife in general. Tree removal, fuel reduction, and ground-disturbing activity during the raptor breeding season would be prohibited, which may benefit several bird species;
- the avoidance of vegetation removal or treatment from mid-April to mid-July, when practicable, may protect nesting migratory birds and other wildlife;
- several steps that would protect or improve habitat for wildlife include the following:
 - the maintenance or improvement of habitat;
 - the establishment of native grasses and forbs;
 - the prohibition of ground-disturbing activities within 150 feet of bodies of water that support native amphibian breeding;
 - the consideration of habitat management for deer;
 - the use of prescribed fire as a management tool;
 - changes in livestock grazing;
 - implementation of weed control; and
 - revegetation.

- predator control would prohibit APHIS from culling or shooting individual animals or destroying their dens, except when individual animals pose a safety risk to humans or for specific reasons, as agreed upon ahead of time.

This alternative is basically the same as Alternative II, in terms of being the most protective of wildlife.

Alternative V would follow restrictions for wildlife outlined in Alternative I, and would add additional beneficial measures for special status species, including the prohibition of activities that would result in direct harm to threatened and endangered or sensitive species. These protective measures include:

- the establishment of a TL within 0.5 mile of documented (occupied or historic) Mexican spotted owl nests to prohibit ground-disturbing activities within 0.5 mile from March 15 to September 1, with permitted activities within this area limited to mesa tops and rims;
- the establishment of a 0.5 mile restriction from active bald eagle or golden eagle nests from March 1 through July 15, and from winter roost or concentration areas from November 16 through April 15;
- the prohibition of ground-disturbing activities within 0.5 mile of bald or golden eagle nest site, or bald eagle winter roost sites (active or historic) with a lease notice for oil and gas activities;
- the prohibition of tree removal and/or of ground-disturbing activity during the raptor nesting season (March 1 through July 15);
- the implementation of the recovery plan for the SWWF,
- the preparation of a HMP for sensitive lizard species;
- the prioritization of the management of cheatgrass and other noxious weeds in vegetation communities that support sensitive reptiles and the re-establishment of native vegetation;
- the fencing of suitable SWWF habitat to exclude livestock grazing; and
- the establishment of a NGD restriction within SWWF habitat and a 0.25-mile buffer of habitat patches.

This alternative would present the greatest amount of protection for special status species with its proactive plans for recovery of the SWWF; its numerous stipulations relating to timing, ground disturbance, and buffer zones; its requirements for the creation of plans; and its prioritization of issues. These measures may protect habitat, lessen disturbance, and reduce habitat alteration and fragmentation for bats, peregrine falcons, bald eagles, ferruginous hawks, burrowing owls, SWWF, both species of lizard, common kingsnakes, Mesa Verde nightsnakes, and special status fish species that occur in the Monument and in the San Juan River.

Cultural Resources Management

Alternative V allows for the development of 13 to 25 sites for public access and interpretation. Stabilization would be allowed at the Monument Manager's discretion, primarily to address human impacts. Development of each site, the attendant studies, visitor presence, the additional access, and the greater level of overall visitor use may cause disturbance impacts to wildlife, especially to special status species and their habitat. However, the impacts may be minor, considering the relatively small surface area and the few number of sites involved. Under this alternative, scientific excavation would be timed to avoid special status species impacts, and sites could be closed during critical periods of occupancy. This alternative would

protect cultural resource communities and sites, preventing large areas of land from being disturbed, which may benefit wildlife.

Fluid Minerals Management

Fluid minerals management under Alternative V would use the same management activities as those proposed under Alternatives II, III, and I. However, the majority would follow Alternative II, including the number of acres available for lease. New fluid minerals leases would be allowed on up to 880 acres for the protection of drainage. This may result in 18 acres of ground disturbance. NSO stipulations would be included for areas of cultural and natural value. An EA or an EIS would be required for a seismic operation. Geophysical operations would only be allowed to use BLM-defined roads, and would be required to avoid biological crust communities. COAs (e.g., stipulations) would be applied to operational approvals, such as APDs. These actions may benefit wildlife and may help to protect special status species.

Rangeland Resources Management

Under Alternative V, the Monument would be stocked at 6,437 active AUMs. This would be a substantial decrease from the current 8,492 AUMs. Five livestock grazing allotments would be closed. The allowable utilization level would be limited to 50 percent of the current year's production of desired perennial grass species, where Public Land Health Standards are being met. An allowable utilization level of 35 percent, on a by-pasture basis, would be implemented where Public Land Health Standards are not being met. Term livestock grazing permits would be modified to meet Public Land Health Standards.

Compliance with Public Land Health Standards may be achieved expeditiously as the result of reducing authorized use, adjusting spring livestock grazing duration and extent of use, and implementing a rest-rotation grazing system. Existing term livestock grazing permits would be reviewed on a regular schedule and revised, as necessary, in order to address current allotment conditions and permittee needs, in the context of achieving the Public Land Health Standards. Land health monitoring would continue.

This alternative may improve land health as rapidly as possible while, at the same time, maintaining use by livestock, reducing competition for forage, and improving habitats for a variety of wildlife species. Increased vegetation, coming as a result of this alternative, may benefit special status species by enhancing cover and forage for their prey.

Recreation and Transportation Management

A primary factor to consider when determining impacts from recreation on wildlife is visitation. Human presence is known to disturb wildlife, particularly during sensitive times of the year, such as during nesting, breeding, and/or during preparation for winter. Recreation strategies that promote visitation may result in greater impacts to wildlife. This alternative would contain a mix of promotion strategies. The BLM would manage an undeveloped strategy, with minimal facilities, for local visitors on 163,666 acres; a destination strategy, with appropriate support facilities, for regional visitors on 160 acres; and a destination strategy, with additional facilities, for national and international visitors on 174 acres.

Transportation management under Alternative V would involve a total of 169 miles of roads, which equates to 980 acres of ground disturbance. Road density under this alternative would be 0.66 miles per square mile. Although these activities may have the potential to cause wildlife disturbance, limitations on location and extent of recreation and transportation actions may help to minimize impacts.

Other Resources Management

Perhaps the most important resource for wildlife, particularly in arid regions, is water. Riparian and wetland areas show the greatest diversity in vegetation and wildlife species. Alternative V would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Under this alternative, groundwater and new water developments would be discouraged. This alternative, along with Alternative II, is the most protective of water resources and wildlife.

This alternative maximizes the protection of large blocks of land for a variety of resource purposes. As a result, wildlife may benefit from these actions. In particular, 25,549 acres would be managed as WSAs, 5,223 acres would be managed for wilderness character, and 7,826 acres would be managed as RNA.

4.2.7.3. Wildlife and Special Status Species Management Impact Comparison

The wildlife and special status species impact comparison is presented in Table 4-15. This table compares the consequences of resource management actions under each alternative on wildlife.

4.2.7.4. Cumulative Impacts

Oil and gas development on private lands in the Monument, as well as on adjacent areas, would be expected to be similar in nature and extent to the impacts on the BLM portions of the Monument. The total surface area of private lands within the boundary of the Monument is nearly 18,000 acres. These areas, in particular, may result in cumulative impacts to wildlife due to changes in native vegetation, big-game winter range, and/or to other habitat changes. Moreover, impacts on private lands may be significantly greater than on BLM lands if reclamation of disturbed areas, avoidance of riparian areas, and maintenance of vegetation health is not performed to the same standards as that required by the BLM. Similarly, protective stipulations, such as NGDs/NSOs, would not be required of private landowners.

Cumulative impacts may occur if there were increased development and recreational use on adjacent private lands, as well as on other BLM lands and Native American tribal lands to the south and west of the Monument. Many of the adjacent farmlands are converting to subdivisions, which may reduce their wildlife habitat potential and increase the potential for disturbance. This development sets the Monument up to be an oasis of wildlife habitat.

Impacts to wildlife, and to special status species in particular, may result from increasing levels of human use and from development throughout the region, regardless of management actions taken in the Monument. The anticipated increase in recreational use and/or other vehicle-related disturbance offsite, as a consequence of continued human population growth, may further add to adverse impacts. However, beneficial impacts, such as those from road closures, reduced livestock grazing, and from the maintenance of large undisturbed land blocks may help to offset these impacts. For larger, more wide-ranging species, such as mountain lion or black bear, the combined impact of smaller-scale impacts may become disproportionately large and result in population declines.

Table 4-15 Comparison of Impacts to Terrestrial and Aquatic Wildlife Species					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Wildlife Resources	Continue existing protective measures. Control by APHIS targets for individual animals anywhere on Monument.	Apply many strict protective measures. Control by APHIS targets on individual animals Monument-wide, when human safety is an issue.	Apply some strict protective measures. Designate some areas for animal control by APHIS, only when human safety is an issue.	Apply some strict protective measures. Control by APHIS targets on individual animals anywhere in the Monument.	Apply many strict protective measures. Control by APHIS targets on individual animals. Monument-wide, only when human safety is an issue.
Special Status Species	Apply no species-specific restrictions.	Apply species-specific restrictions.	Apply species-specific restrictions.	Apply species-specific restrictions.	Apply species-specific restrictions.
Cultural Resources	Develop new sites for controlled visitation. Protect cultural sites.	Identify 13 sites for development and visitation. Protect cultural resource communities, sites, and isolated finds.	Identify 13 to 25 sites for development and visitation. Protect cultural resource communities and sites.	Identify 13 to 25 sites for development and visitation. Protect cultural resource communities and sites.	Identify 13 to 25 sites for development and visitation. Protect cultural resource communities and sites.
Fluid Minerals	No impact.	Make up to 880 new acres available for leasing (with up to 18 acres of disturbance).	Make up to 3,021 new acres available for leasing (with up to 73 acres of disturbance).	Make up to 24,462 new acres available for leasing (with up to 447 acres of disturbance).	Make up to 880 new acres available for leasing (with up to 18 acres of disturbance).
Rangeland Resources	Permit 8,492 AUMs, 28 allotments. Not achieving Public Land Health Standards.	Permit 6,437 AUMs, 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health	Permit 8,368 AUMs, 23 allotments. Take specific actions to progress toward meeting Public Land	Permit 8,492 AUMs, 28 allotments. Take specific actions to progress toward meeting Public Land	Permit 6,437 AUMs, 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health

Table 4-15 Comparison of Impacts to Terrestrial and Aquatic Wildlife Species					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
		Standards.	Health Standards.	Health Standards.	Standards.
Recreation and Transportation	Promote no specific recreation strategy (with facility development as needed). Maintain developed recreation sites. Manage 149 miles of roads (864 acres of disturbance).	Promote undeveloped strategy (with minimum facilities). Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry use. Manage 139 miles of roads (806 acres of disturbance).	Promote destination strategy (with support facilities). Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry use. Manage 189 miles of roads (1,096 acres of disturbance).	Promote destination strategy (with more facilities). Manage 47,056 acres for public visitation. Manage 118,279 acres for backcountry use. Manage 213 miles of roads (1,235 acres of disturbance).	Promote a combination of strategies. Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry use. Manage 169 miles of roads (980 acres of disturbance).
Other Resources: Water Resources	Protect 2,415 acres of riparian system. Apply no restrictions on groundwater and new water developments.	Protect 5,312 acres of canyon bottoms; riparian areas, and floodplains. Discourage groundwater developments.	Protect 5,312 acres of canyon bottoms; riparian areas, and floodplains. Allow groundwater developments.	Protect 3,217 acres of riparian areas and floodplains. Encourage groundwater developments.	Protect 5,312 acres of canyon bottoms; riparian areas, and floodplains. Discourage groundwater developments.
Other Resources: Special Designations	Manage 25,549 acres as WSA. Designate no WSR. Manage 427 acres as RNA.	Manage 25,549 acres as WSA. Manage 5,223 acres for wilderness character. Designate all eligible river segments suitable as WSRs (25.3 miles). Manage 7,826 acres as RNA.	Manage 25,549 acres as WSA. Designate no river segments suitable as WSR. Manage 427 acres as RNA.	Manage 25,549 acres as WSA. Designate no river segments suitable as WSR. Manage 427 acres as RNA.	Manage 25,549 acres as WSA. Manage 5,223 acres for wilderness character. Designate no river segments suitable as WSR. Manage 7,826 acres as RNA.

4.2.8. Vegetation Resources

The primary goal for vegetation resource management in the Monument is to sustain a biologically diverse landscape that supports a variety of habitats and native plant and animal species. The management objectives related to this goal include:

- protect and/or enhance upland vegetation communities to ensure that the Public Land Health Standards for healthy, productive plant and animal communities is met, or that significant progress is being made toward achieving it;
- reclaim and rehabilitate disturbed areas impacted by wildland fire and other surface-disturbing activities (e.g., well pad sites, pipeline roads, closed roads) to protect soil, water, and vegetation resources;
- protect and/or enhance aquatic, wetland, and riparian areas to ensure that the Public Land Health Standards for riparian systems is met, or that significant progress is being made toward achieving it; and
- cooperate with other agencies and landowners in the prevention, control, or eradication of invasive pests that threaten the health of the ecosystem.

Another goal for vegetation resource management is to control existing noxious weed populations and prevent new infestations. The management objectives related to this goal include:

- inventory and map existing noxious weed populations;
- develop and implement an integrated weed management program, in cooperation with adjacent landowners (i.e., counties, private landowners, Hovenweep National Monument, the Navajo Nation, and the Ute Mountain Ute Tribe), which includes mechanical, biological, and chemical control techniques, and which emphasizes prevention, inventory, detection and monitoring, and project actions; and
- prevent the establishment of new infestations of noxious weeds and the spread of existing populations.

Listed, proposed or candidate threatened or endangered plant species would be managed to comply with provisions of the ESA, including the need for listing proposed or candidate species. The management goal for special status plants and significant plant communities, and their habitat, is to reach a point where special status recognition is no longer warranted.

Native vegetation in the Monument is conceptually subdivided into the general community types described and quantified by area in Section 3.1.8. A distinction is made between upland vegetation and those areas classified as riparian/wetland areas. Additionally, noxious weeds are considered a separate vegetation management category, as are special status-plant species and significant plant communities. These distinctions are carried through the following discussion.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short- and long-term impacts to vegetation resources.

A number of management actions proposed under the alternatives have the potential to impact native vegetation. For this discussion, adverse direct impacts to upland vegetation may include, but are not limited to, disruption and/or removal of rooted vegetation resulting in a reduction in areas of native plant communities, reduction of total numbers of plant species (species

richness) within an area, and/or reduction or loss of total area, diversity, structure, or function of wildlife habitat. Adverse direct impacts to riparian/wetland areas may include, but are not limited to, those expressed for upland vegetation, as well as increased sedimentation due to local surface disturbance, soil and bank erosion, and changes to channel morphology. Beneficial direct impacts to vegetation resources may include, but are not limited to, an increase in areas of native plant communities, a decrease in the size of noxious weed populations, and an increase in species diversity and/or structure within these native plant communities.

A number of indirect impacts to vegetation resources may also be possible as a result of proposed management actions. Most indirect adverse impacts are assumed to result from direct impacts, in proportion to the relative amount of associated surface disturbance. Adverse indirect impacts may include, but are not limited to, the disruption and/or reduction of pollinator populations; the loss of habitat suitable for colonization, due to surface disturbance; the introduction of noxious weeds by various vectors or conditions that enhance the spread of weeds; and the general loss of habitat, due to surface occupancy, surface compaction, and/or trampling. Physical disruption may result in sedimentation into occupied habitat and/or potential habitat. Failed reclamation or mitigation may also result in indirect impacts to these resources. Indirect impacts to riparian/wetland areas may also include disruption of hydrological processes, decreased ability to trap sediments and nutrients and to moderate surface flow, decreased infiltration for groundwater recharge, increased runoff, and focused livestock grazing pressure or wildlife use in less impacted riparian/wetland areas. Additional indirect impacts from increased erosion and sedimentation may occur to riparian/wetland areas located near surface disturbances, even if the resource itself may be purposely avoided to reduce direct impacts. Beneficial indirect impacts may result from minimizing or preventing surface disturbance (and, therefore, disturbance to vegetation) as a result of protection of other resources.

4.2.8.1. Evaluation Criteria and Assumptions

The most adverse direct impacts to vegetation result from surface disturbances; therefore, these areas are the primary parameter for discussion and comparison of impact analysis for vegetation resources. Areas reclaimed, otherwise improved, and/or protected from ground disturbance are used to describe beneficial impacts. Estimates of surface disturbance areas associated with potential management actions were calculated using data from the AMS (BLM 2005b) and from the RFD (BLM 2005c), and are summarized in Table 4-1. Proposed surface-use restrictions are listed and summarized in Table 2-1. When quantitative analysis is not possible, categories are based upon the potential physical impacts in relation to Colorado Public Land Health Standards.

Assumptions included in the analysis of impacts to vegetation resources include the following:

- Estimated disturbance areas are distributed among upland and riparian/wetland communities in proportion to their relative area throughout the Monument, unless otherwise limited by applicable surface-use restrictions.
- Application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E).
- Federal lands within the Monument boundary are the subject of the impact analysis.
- The entire vicinity that comprises the Colorado Plateau Semi-desert ecoregion (Bailey 1995) is the subject of the cumulative impacts analysis.

4.2.8.2. Alternative Analysis

Impacts to vegetation resources may differ in extent and severity, depending on specific management actions proposed under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from management actions proposed for vegetation resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland, and recreation and transportation.

Alternative I (No Action Alternative)

Vegetation Resources Management

This analysis assumes that current vegetation resource conditions and trends described in Section 3.1.8 would continue into the future under this alternative. Therefore, under Alternative I (the No Action Alternative), the condition of the three dominant native upland communities may be expected to continue generally in a stable degraded state or downward trend.

Alternative I would contain several specific management actions intended to protectively manage riparian and wetland areas (including springs). Nevertheless, based on current conditions and trends, most of these vegetation communities would be expected to remain in Functional At-Risk (53 percent) or Non-Functional (27 percent) categories. Over time, this trend may continue to result in adverse impacts to most of these communities, as well as in failure to meet Public Land Health Standards.

Noxious weed management would be included under Alternative I, but in a very general sense. No specific plan would be called for, and no specific actions for inventory or prioritized integrated management would be specified. Under this continuing management (Section 3.1.8), noxious weed populations may be expected to increase in frequency, density, and diversity over the time period of this analysis. This may result in an increase in the existing adverse impacts to vegetation resources as noxious weed populations continue to invade and expand into native plant communities, as well as in subsequent failure to meet Public Land Health Standards.

Other than stipulations discussed in Fluid Minerals Management (below), Alternative I does not include any specific management actions for special status plant species and/or for significant plant communities.

Cultural Resources Management

Under this alternative, few of the cultural resources management actions would impact vegetation, either directly or indirectly; therefore, continuing management may be expected to result in few impacts to vegetation resources. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized, adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

Fluid Minerals Management

Under Alternative I (the No Action Alternative), currently unleased acres would continue to be unavailable for new fluid minerals leases. However, development of currently leased areas would continue. In addition to direct impacts of surface disturbance, other ongoing management actions associated with fluid minerals exploration and development have been noted as a factor in the observed downward trend in upland plant communities. This is due to incomplete or failed reclamation of closed and abandoned well pads, as well as to associated roads and other infrastructure. Many of these sites support little vegetation and are often

dominated by noxious weeds. These areas then serve as centers of disturbance from which weeds and other undesirable plants spread into native vegetation. These factors are expected to continue to result in adverse impacts to vegetation resources.

Alternative I would include a CSU stipulation for riparian/wetland vegetation zones. This may provide beneficial impacts because these resources would then be avoided during development activities. There are no stipulations under Alternative I, for the specific protection of special status plant species and/or for significant plant communities from ground disturbance as a result of oil and gas lease development activities. Adverse impacts may result from disturbance to habitat or direct removal of these resources.

Rangeland Resources Management

Alternative I would include a total of 8,492 active AUMs and 28 allotments. The impact of livestock grazing on native plant species' community structure, cover, and diversity is variable. This is due to initial conditions and non-uniform grazing patterns that reflect differences in terrain, forage abundance and preference, and/or soil attributes. Nonetheless, management of rangeland resources in many allotments may be considered part of the reason for such allotments not meeting the Public Land Health Standards for healthy, productive plant and animal communities and for the downward trend observed in much of the native upland vegetation in the Monument. Likewise, livestock grazing is considered part of the reason the majority of riparian/wetland areas are not currently achieving PFC. The current management of rangeland resources, including active AUMs and allotments, is important factor in these trends and, over time, may contribute to adverse impacts to most of these vegetation communities, as well as continued failure to meet Public Land Health Standards.

Recreation and Transportation Management

Due to the restriction on new oil and gas leases, Alternative I would result in relatively low surface impacts from road development. Under this alternative 149 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support existing oil and gas leases). This may result in 864 acres of surface disturbance, and the second-lowest road density (0.58 miles per square mile) of any of the alternatives.

These factors may contribute to beneficial direct impacts to all native vegetation over the long-term, as fragmentation of habitat and chances of disturbance to special status plant species and significant plant communities would be relatively limited, and existing roads would be returned to native vegetation through reclamation. Indirectly, opportunities for noxious weed infestations occurring along roadsides may be reduced in proportion to the reduction in total miles of roads.

Other Resources Management

At present, 25,549 acres of the Monument surface are managed as three WSAs using existing non-impairment standards and practices, in accordance with Interim Management Policy, until the areas are designated as wilderness, or until they are released by Congress (BLM 1995). The continued restrictions on permanent structures, facilities, and/or on surface disturbing activities may continue to result in indirect beneficial impacts to native vegetation in these areas. This is especially the case for mature pinyon-juniper woodlands. This is because the largest continuous stands in the Monument occur in these areas (see Map 13). Several large areas of biological crust communities may also benefit from surface restrictions in the WSAs. Under the No Action Alternative, should these areas be released from WSA status, they would be managed for wilderness characteristics, which is a distinction that may result in some limited adverse impacts to these resources.

Under this alternative, the 427 acre McElmo RNA would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, this area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to vegetation resources in this area.

Alternative II

Vegetation Resources Management

Similar to the other action alternatives, Alternative II would emphasize management of vegetation resources with several specific management actions not included under Alternative I. These actions focus on vegetation as a resource with specific intrinsic value, instead of only in terms of rangeland or forestry values. In general, this may result in beneficial impacts to vegetation resources. Actions include implementing restoration/revegetation activities on a predetermined and prioritized schedule in areas where management changes alone would not improve resource conditions; extending livestock exclusion periods in areas following vegetation management treatments for at least two years; requiring reduced livestock stocking levels and the most limited livestock utilization (no more than 35 percent of current year's herbaceous production); and requiring certified weed-free native plant species for reclamation seeding and planting. Implementation of these actions may result in beneficial impacts to vegetation resources, and may help the Monument progress toward meeting Public Land Health Standards.

Management of riparian and wetland areas under all of the action alternatives (II through V) would occur; however, management under Alternative II would be more specific and standard-driven (achieving PFC) than it would be under Alternative I. This may eventually result in beneficial impacts to riparian and wetland vegetation.

In addition, Alternative II is the only alternative with a stated emphasis on systematic noxious weed inventory, mapping, and monitoring. These management actions may allow for a far more focused and effective application of the current weed-management program in that they would provide data and information upon which to base a number of important decisions, such as incipient population locations, priority-to-control strategies, and the efficacy of different integrated methods for particular species and locations. Over time, this combination of management actions may indirectly result in beneficial impacts to vegetation resources.

Unlike Alternative II, all of the action alternatives would direct a number of focused management actions toward special status plant species and/or significant plant communities. These would include developing inventory and monitoring plans; and specifying avoidance of long-term ground-disturbing activities in the vicinity of known populations, community locations, and/or potential habitat. Road relocation and/or realignment would be called for, if monitoring results indicate damage or disturbance is occurring. An NGD/NSO restriction would protect occupied and potential habitat for sensitive species. Under Alternative II, several of these actions would be strengthened. This would include requirements for specific protective TLs for livestock grazing in areas where biological soil crust communities occur, as well as requirements for locating new roads away from biological crust communities with a 100-foot buffer, and the removal of the source of disturbance to these resources when detected during monitoring. It is expected that these may result in beneficial impacts to special status plant species and/or significant plant communities, and may help the Monument make progress toward achieving Public Land Health Standards.

Cultural Resources Management

Under this alternative, few cultural resources management actions impact vegetation, either directly or indirectly. However, to some degree, development, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

Under Alternative II, indirect beneficial impact to vegetation may result due to the fact that the Monument is mandated to protect cultural resource communities, sites, and/or isolated finds. This would result in more numerous, larger areas in the Monument where no direct surface disturbing impacts would be allowed. This may result in the indirect protection of the vegetation resources within these areas and may provide widespread beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative II, up to 880 acres of lands currently unavailable for leasing could be leased. This may result in the development of up to 2 well pads, with up to 12 acres (less than 0.01 percent of the total public lands in the Monument) of long-term disturbance (see Table 4-1). The result of leasing these areas under Alternative II may be limited adverse impacts to vegetation resources. Many of these may be mitigated by the application of appropriate BMPs, and by the use of standardized reclamation practices, such as COAs on the new leases.

Similar to the other action alternatives, Alternative II includes stipulations that may protect vegetation resources, including NSOs for threatened, endangered, candidate, or other special status plant species, and/or for riparian zone/wetland habitat. Lease notices would be used to alert potential lessees to these stipulations. These protections may result in more beneficial impacts to these resources than those expected under Alternative I.

Rangeland Resources Management

Similar to the other action alternatives, Alternative II emphasizes rangeland management actions that may improve rangeland conditions, and may help the Monument make progress toward meeting Public Land Health Standards for upland and riparian/wetland vegetation communities, for special status plant species, and/or for significant plant communities. The number of active AUMs allowed under Alternative II (6,437) is 24 percent less than those allowed under the No Action Alternative (8,492). Active allotments would be reduced from 28 to 23. Although the impacts of livestock grazing on native plant species' community structure, cover, and diversity is variable (due to initial conditions and non-uniform grazing patterns that reflect differences in terrain, forage abundance and preference, and soil attributes), this large reduction in AUMs may result in a substantial beneficial impact to vegetation communities. This is because under this alternative, pressure from livestock grazing would be considerably reduced in proportion to the total AUMs. Alternative II is expected to result in the most rapid movement toward achieving Public Land Health Standards for both upland and riparian/wetland vegetation than any of the other alternatives.

In addition, in comparison to the other action alternatives, only Alternative II consists of a number of management actions that may result in larger and/or more comprehensive beneficial impacts to vegetation. These include:

- not allowing livestock supplemental feeding or temporary range improvement structures;
- using specific adjustments when utilization or stubble height standards are not met;

- applying specific protective TLs for livestock grazing in areas where biological soil crust communities occur;
- limiting spring grazing to no more than one year in a three-year period per grazing unit;
- requiring a regular schedule for Allotment Management Plan (AMP) reviews and revisions; and
- limiting allowable utilization levels to no more than 35 percent of current year's growth of desired perennial grass species.

Implementation of these actions under Alternative II may result in more beneficial impacts to vegetation resources than under any of the other alternatives.

Recreation and Transportation Management

Alternative II, in terms of transportation management, is the most restrictive of all of the alternatives. Under this alternative, 139 miles of roads would be open to forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 806 acres of surface disturbance, as well as the lowest road density (0.54 miles per square mile) of any of the alternatives.

These factors may contribute to beneficial direct impacts to all native vegetation over the long-term, as fragmentation of habitat and chances of disturbance impacts to special status plant species and/or significant plant communities would be relatively limited, and existing roads would be returned to native vegetation through reclamation. Indirectly, opportunities for noxious weed infestations occurring along roads may be reduced in proportion to the reduction in total miles of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative II, management of the 25,549 acres of the Monument surface designated as WSAs would continue using existing non-impairment standards and practices, in accordance with Interim Management Policy, until the areas are designated as wilderness or until they are released by Congress (BLM 1995). The continued restrictions on permanent structures, facilities, and surface disturbing activities may continue to result in indirect beneficial impacts to native vegetation in these areas. This is especially the case for mature pinyon-juniper woodlands because the largest continuous stands in the Monument occur in these areas (see Map 13). Several large areas of biological crust communities may also benefit from surface restrictions in the WSAs. Under Alternative II, these areas would also be designated as NGD/NSO. Therefore, should these areas be released from WSA status, they would still be protected from surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives also include management actions intended to protect and enhance the wilderness characteristics of the WSA areas. An additional 5,223 acres of citizen-proposed areas with wilderness character would be managed as such under Alternative II. All of these actions may result in greater beneficial impacts to vegetation resources than those expected under Alternative I (the No Action Alternative).

Under this alternative, the existing McElmo RNA would be considerably expanded, when compared with Alternative II (from 427 to 7,826 acres), with special management prescriptions put in place for herpetological research and habitat protection. This area would also be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to vegetation resources in this area.

Alternative II also would include management of 25.3 miles of river reaches as suitable for Wild and Scenic River (WSR) designation. This may result in beneficial impacts to vegetation resources in existence throughout these reaches.

Alternative III

Vegetation Resources Management

Similar to the other action alternatives, Alternative III emphasizes management of vegetation resources that includes several specific management actions not included under Alternative I. However, the specifics of many of these actions are not as proactive in terms of protecting and fostering native vegetation as they are under Alternative II. Implementation of these actions may result in beneficial impacts to vegetation resources, and may help the Monument progress toward meeting Public Land Health Standards, although for smaller areas and over a longer period of time than under Alternative II.

Management of riparian and wetland areas under all of the action alternatives (II through V) would occur under actions more specific and standard-driven (achieving PFC) than under Alternative I. This may eventually result in beneficial impacts to riparian and wetland vegetation.

Although Alternatives III and IV would specifically address noxious weed management, they do not include the stated emphasis on systematic noxious weed inventory, mapping, and monitoring as that included under Alternative II. Therefore, over time, this combination of management actions may indirectly result in some beneficial impacts on vegetation resources.

Unlike Alternative I, all of the action alternatives would direct a number of focused management actions toward special status plant species and/or significant plant communities. These would include developing inventory and monitoring plans; and specifying avoidance of long-term ground-disturbing activities in the vicinity of known populations, community locations, and/or potential habitat. Road relocation or realignment would be called for, if monitoring results indicate damage or disturbance is occurring. An NGD/NSO restriction may protect occupied and potential habitat for sensitive species. Although Alternative III includes somewhat less stringent timing and specifications for these actions than those proposed under Alternatives II and V, it is expected that these may result in beneficial impacts to special status plant species and/or to significant plant communities, and may help the Monument make progress toward achieving Public Land Health Standards.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact vegetation, either directly or indirectly. However, to some degree, development, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

Under Alternative III, indirect beneficial impacts to vegetation may result due to the fact that the Monument is mandated to protect cultural resource communities and/or sites. This would result in more numerous, larger areas in the Monument where no direct surface-disturbing impacts would be allowed. This may result in the indirect protection of the vegetation resources within these areas and provide widespread beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres of lands currently unavailable for leasing could be leased. This may result in up to eight well pads being developed, with up to 57 acres of long-term disturbance. The result of leasing these areas under Alternative III may be more direct adverse impacts to vegetation resources than under Alternatives I, II, and V, but less than under Alternative IV. Many of these may be mitigated by the application of appropriate BMPs and by standardized reclamation practices, such as COAs on the new leases.

Similar to the action alternatives, Alternative III includes stipulations that may protect vegetation resources, including NSOs for threatened, endangered, candidate, or other special status plant species, and/or for riparian zone/wetland habitat. Lease notices would be issued to alert potential lessees to these stipulations. These protections may result in more beneficial impacts to these resources than those expected under Alternative I.

Rangeland Resources Management

Alternative III emphasizes rangeland management actions that may improve rangeland conditions, and may help the Monument make progress toward meeting Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or for significant plant communities. However, the number of active AUMs under Alternative III is only slightly less than the highest number allowed under the No Action Alternative (8,368 versus 8,492), and can be accounted for in closing five allotments. Management of rangeland resources in many allotments may be considered one of the reasons for such allotments not meeting the Public Land Health Standards for healthy, productive plant and animal communities, and for the downward trend observed in much of the native upland vegetation in the Monument. Likewise, livestock grazing is considered one of the reasons the majority of riparian/wetland areas are not currently achieving PFC. The current management of rangeland resources, including active AUMs and allotments, is an important factor in these trends and, over time, may contribute to adverse impacts to most of these vegetation communities, as well as continued failure to meet Public Land Health Standards.

Similar to the other action alternatives, Alternative III includes rangeland management actions that may improve rangeland conditions, and may help the Monument make progress toward meeting Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or for significant plant communities. In general, these may result in beneficial impacts to vegetation resources. However, they are expected to be less than those expected under Alternative II, which consists of a number of management actions that may result in larger and/or more comprehensive beneficial impacts to vegetation.

Recreation and Transportation Management

Alternative III, in terms of transportation management, would be the second least restrictive of all of the alternatives. Under this alternative 189 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 1,096 acres of surface disturbance, as well as the second highest road density (0.73 miles/square mile) of any of the alternatives.

These factors may contribute to adverse direct impacts to all native vegetation over the long-term due to increased fragmentation of habitat and to disturbance impacts to special status plant species and/or to significant plant communities. Relatively few existing roads would be returned to native vegetation through reclamation under this alternative. Indirectly, opportunities for noxious weed infestations may increase in proportion to the increased numbers of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative III, management of the 25,549 acres of the Monument surface designated as WSAs would continue, using existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). The continued restrictions on permanent structures, facilities, and surface-disturbing activities may continue to result in indirect beneficial impacts to native vegetation in these areas. This is especially the case for mature pinyon-juniper woodlands because the largest continuous stands in the Monument occur in these areas (see

Map 13). Several large areas of biological crust communities may also benefit from these surface restrictions in the WSAs. As under all of the action alternatives, these areas would also be designated as NGD/NSO. Therefore, should these areas be released from WSA status, they would still be protected from surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives also include management actions intended to protect and enhance the wilderness characteristics of the WSA areas. These actions may result in greater beneficial impacts to vegetation resources than those expected under Alternative I.

Under this alternative, the 427 acre McElmo RNA would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, this area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to vegetation resources in this area.

Alternative IV

Vegetation Resources Management

Similar to the other action alternatives, Alternative IV emphasizes management of vegetation resources that include several specific management actions not included under Alternative I. However, the specifics of many of these actions are not as proactive in terms of protecting and fostering native vegetation as they are under Alternative II. Implementation of these actions may result in beneficial impacts to vegetation resources, and may help the Monument make progress toward meeting Public Land Health Standards, although in smaller areas and over a longer period of time than under Alternative II.

Management of riparian and wetland areas under all of the action alternatives (II through V) would occur under actions more specific and standard-driven (achieving PFC) than under Alternative I. This may eventually result in beneficial impacts to riparian and wetland vegetation.

While Alternatives III and IV would specifically address noxious weed management, they do not include the stated emphasis on systematic noxious weed inventory, mapping, and monitoring included under Alternative II. Therefore, over time, this combination of management actions may indirectly result in beneficial impacts to vegetation resources.

Unlike Alternative I, all of the action alternatives would direct a number of focused management actions toward special status plant species and/or significant plant communities. These would include developing inventory and monitoring plans; and specify avoidance of long-term ground-disturbing activities in the vicinity of known populations, community locations, and/or potential habitat. Road relocation or realignment would be called for, if monitoring results indicate that damage or disturbance is occurring. An NGD/NSO restriction would protect occupied and potential habitat for sensitive species. Although Alternative IV includes somewhat less stringent timing and specifications for these actions than those proposed under Alternatives II and V, it is expected that these may result in beneficial impacts to special status plant species and/or to significant plant communities, and may help the Monument make progress toward meeting Public Land Health Standards.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact vegetation, either directly or indirectly. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be

dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

Under Alternative IV, an indirect beneficial impact to vegetation may result due to the restriction of any direct impacts to cultural resource communities or sites. This restriction could be expected to eventually result in more numerous, larger areas in the Monument where no direct impacts would be allowed. This may result in the indirect protection of the vegetation resources within these areas and eventually provide beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative IV, a notably larger number of acres (up to 24,462) currently unavailable for leasing could be leased. This may result in up to 59 well pads being developed, with up to 338 acres of long-term disturbance. Although these disturbances may be mitigated by application of appropriate BMPs and by standardized reclamation practices (such as COAs on the new leases), leasing these areas may result in considerably more direct adverse impacts to vegetation resources than under any other alternative.

Similar to all of the action alternatives, Alternative IV includes stipulations that would protect vegetation resources, including NSOs for threatened, endangered, candidate, or other special status plant species, and for riparian zone/wetland habitat. Lease notices would be used to alert potential lessees to these stipulations. However, the areas included in the defined riparian zones are relatively smaller under Alternative IV than under any of the other action alternatives. Therefore, the beneficial impacts that may result from these would be proportionally smaller under Alternative IV.

Rangeland Resources Management

Alternative IV would emphasize rangeland management actions with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or significant plant communities. However, the number of active AUMs under Alternative IV is the same as the No Action Alternative (8,492) with the same total of allotments (28). Management of rangeland resources in many allotments is considered one of the reasons for such allotments not meeting the Public Land Health Standards for healthy, productive plant and animal communities and for the downward trend observed in much of the native upland vegetation in the Monument. Likewise, livestock grazing is considered one of the reasons the majority of riparian/wetland areas are not currently achieving PFC. The current management of rangeland resources, including active AUMs and allotments, would continue to be an important factor in these trends and, over time, may contribute to adverse impacts to most of these vegetation communities, as well as continued failure to meet Public Land Health Standards.

Nevertheless, similar to the other action alternatives, Alternative IV would emphasize rangeland management actions with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or significant plant communities. In general, these may result in beneficial impacts to vegetation resources. However, they are expected to be less than those under Alternative II, which consists of a number of management actions that may result in more comprehensive beneficial impacts to vegetation.

Recreation and Transportation Management

Alternative IV, in terms of transportation management, would be the least restrictive of all of the alternatives. Under this alternative, 213 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil

and gas leases). This may result in 1,235 acres of surface disturbance, as well as in the highest road density (0.83 miles per square mile) of any of the alternatives.

These factors may contribute to some adverse direct impacts to all native vegetation over the long-term due to increased fragmentation of habitat and to disturbance impacts to special status plant species and/or to significant plant communities. Relatively few existing roads would be returned to native vegetation through reclamation under this alternative. Indirectly, opportunities for noxious weed infestations may increase in proportion to the increased numbers of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative IV, management of the 25,549 acres of the Monument surface designated as WSAs would continue, using existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). The continued restrictions on permanent structures, facilities, and/or on surface-disturbing activities may continue to result in indirect beneficial impacts to native vegetation in these areas. This is especially the case for mature pinyon-juniper woodlands because the largest continuous stands in the Monument occur in these areas (see Map 13). Several large areas of biological crust communities may also benefit from surface restrictions in the WSAs. As under all of the action alternatives, these areas would also be designated as NGD/NSO. Therefore, should these areas be released from WSA status, they would still be protected from surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives also include management actions intended to protect and enhance the wilderness characteristics of the WSA areas. These actions may result in greater beneficial impacts to vegetation resources than those expected under Alternative I.

Under this alternative, the 427 acre McElmo RNA would continue to be managed with special management prescriptions for herpetological research and habitat protection. This area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to vegetation resources in this area.

Alternative V (Preferred Alternative)

Vegetation Resources Management

Similar to the other action alternatives, Alternative V (the Preferred Alternative) emphasizes management of vegetation resources that would include several specific management actions not included in Alternative I. In general, these may result in beneficial impacts to vegetation resources. In terms of several vegetation management actions, Alternative V represents a middle-ground scenario between the most protective aspects of Alternative II, and the less stringent actions proposed under Alternatives III and IV.

Management of riparian and wetland areas under all of the action alternatives (II through V) would occur under actions more specific and standard-driven (achieving PFC) than under Alternative I. This may eventually result in beneficial impacts to riparian and wetland vegetation.

Alternatives II and V would include a stated emphasis on systematic noxious weed inventory, mapping, detection, and monitoring. These management actions may allow for a far more focused and effective application of the current weed management program by providing data and information upon which to base a number of important decisions, such as incipient population locations, priority-to-control strategies, and the efficacy of different integrated methods for particular species and locations. Over time, this combination of management actions may indirectly result in beneficial impacts on vegetation resources.

Unlike Alternative I, all of the action alternatives would direct a number of focused management actions toward special status plant species and/or significant plant communities. These would include developing an inventory and monitoring plan; and specifying avoidance of long-term ground-disturbing activities in the vicinity of known populations, community locations, and/or potential habitat. Road relocation or realignment would be called for, if monitoring results indicate that damage and/or disturbance is occurring. An NGD/NSO restriction would protect occupied and potential habitat for sensitive species. Similar to Alternative II, under Alternative V several of these actions would be strengthened in terms of protective management of these resources, including a requirement for specific protective TLs for livestock grazing in areas where biological soil crust communities occur, as well as requirements for locating new roads away from biological crust communities with a 100-foot buffer and the removal of the source of disturbance to these resources when detected during monitoring. The result may be beneficial impacts to special status plant species and/or to significant plant communities, and the achievement of Public Land Health Standards.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact vegetation, either directly or indirectly. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

Under Alternative V, indirect beneficial impacts to vegetation may result from the restriction of any direct impacts to cultural resource communities and/or sites. This restriction may eventually result in more numerous, larger areas in the Monument where no direct impacts would be allowed. This may result in the indirect protection of the vegetation resources within these areas, and eventually provide beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative V, up to 880 acres of lands currently unavailable for leasing could be leased. This may result in the development of up to two well pads, with up to 12 acres of long-term disturbance. The result of leasing these areas under Alternative V may be limited adverse impacts to vegetation resources. Many of these may be mitigated by application of appropriate BMPs and by standardized reclamation practices, such as COAs on the new leases.

Similar to all of the action alternatives, Alternative V would include stipulations that would protect vegetation resources, including NSOs for threatened, endangered, candidate, or other special status plant species, and for riparian zone/wetland habitat. Lease notices would be used to alert potential lessees to these stipulations. These protections may result in more beneficial impacts to these resources than those expected under Alternative I.

Rangeland Resources Management

Similar to the other action alternatives, Alternative V would emphasize rangeland management actions with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or for significant plant communities. Similar to Alternative II, the number of active AUMs under Alternative V would be reduced by 24 percent (6,437) from the No Action Alternative (8,492). Active allotments would be reduced from 28 to 23. Although the impacts of livestock grazing on native plant species' community structure, cover, and diversity is variable (due to initial conditions and non-uniform grazing patterns that reflect differences in terrain, forage abundance and preference, and soil attributes), this reduction in

AUMs may result in a substantial beneficial impacts to vegetation communities because pressure from livestock grazing would be considerably reduced in proportion to the total AUMs. This may result in the most rapid movement toward achieving Public Land Health Standards for both upland and riparian/wetland vegetation than for any of the alternatives.

Alternative V would emphasize rangeland management actions with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards for upland and riparian/wetland vegetation communities, as well as for special status plant species and/or significant plant communities. In general, these may result in beneficial impacts to vegetation resources. However, these benefits are expected to be less than those under Alternative II.

Recreation and Transportation Management

In terms of transportation management, Alternative V falls in the middle of all of the alternatives. Under this alternative 169 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 980 acres of surface disturbance, as well as a road density of 0.66 miles per square mile.

These factors may contribute to adverse direct impacts to all native vegetation over the long-term, due to increased fragmentation of habitat and disturbance impacts to special status plant species and/or significant plant communities. Relatively few existing roads would be returned to native vegetation through reclamation under this alternative. Indirectly, opportunities for noxious weed infestations may increase in proportion to the increased numbers of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative V, management of the 25,549 acres of the Monument surface designated as WSAs would continue, using existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). The continued restrictions on permanent structures, facilities, and/or on surface-disturbing activities may continue to result in indirect beneficial impacts to native vegetation in these areas. This is especially the case for mature pinyon-juniper woodlands because the largest continuous stands in the Monument occur in these areas (see Map 13). Several large areas of biological crust communities may also benefit from surface restrictions in the WSAs. Under Alternative V, these areas would also be designated as NGD/NSO. Therefore, should these areas be released from WSA status, they would still be protected from surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives also include management actions intended to protect and enhance the wilderness characteristics of the WSA areas. An additional 5,223 acres of citizen-proposed areas with wilderness character would be managed as such under Alternative V. All of these actions may result in far greater beneficial impacts to vegetation resources than those expected under Alternative I.

Under this alternative, the existing McElmo RNA would be considerably expanded under Alternative V (from 427 to 7,826 acres), and would continue to be managed with special management prescriptions for herpetological research and habitat protection. This area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to vegetation resources in this area.

4.2.8.3. Vegetation Resources Management Impact Comparison

Table 4-16 compares impacts to upland and riparian/wetland vegetation, noxious weeds, and special status plant species and/or significant plant communities under the five alternatives.

This table compares the consequences of resource management actions under each alternative on fuels and fire.

4.2.8.4. Cumulative Impacts

Cumulative impacts are discussed in terms of: 1) past, present, and future actions in non-BLM portions of the Monument and the surrounding region; 2) the impacts resulting from ongoing actions on BLM lands, not included in this DRMP/DEIS; and 3) the additive and synergistic impacts of multiple management actions on vegetation resources. For this discussion, the region is considered to include the areas immediately adjacent to the Monument, as well as the entire vicinity that comprises the Colorado Plateau Semi-desert ecoregion (Bailey 1995).

Areas adjacent to the Monument are experiencing noxious weed conditions similar to the Monument. Sources of weeds at the Monument boundary include abandoned farmlands, access roads, and field edges. All areas of disturbance without management actions that discourage weeds are especially vulnerable. This is especially true where human traffic and/or wildlife movement transfer weed seeds into new sites.

All of the potential adverse impacts discussed for riparian/wetland areas in the Monument are cumulative, with prior degradation of these areas resulting from livestock grazing, unregulated stream crossings, noxious weed proliferation, and/or drought impacts (Section 3.1.8). These adverse factors are assumed to be present and unmitigated in many riparian/wetland areas in the surrounding region as well. Therefore, adverse impacts that may result from management actions proposed under this DRMP/DEIS have the potential to be cumulatively greater than when assessed in isolation.

Regardless of management actions in the Monument, direct adverse impacts to native vegetation may result from ongoing human development throughout the general region, which would also bring new roads, new fluid minerals development, new housing, new commercial development, and new and increasing recreational use of wildlands. The same indirect impacts to native vegetation discussed above may also result. In many cases, the loss and/or fragmentation of native plant communities would be highly visible. These impacts may continue on a regional scale, and would be in addition to impacts expected from land uses and resource management activities in the Monument. If adverse impacts to these resources continue to increase, as expected, their condition on public lands may become even more important due to their intrinsic value, the biodiversity they represent, and the continuation of the ecological values they support.

Under the No Action Alternative, the currently unleased acres would continue to be unavailable for new fluid minerals leases. However, continued development of areas currently leased may result in up to 121 new well pads over the next 20 years, with up to nine new associated treatment facilities, up to 53 miles of pipeline, and up to 67 miles of roads. The expected commensurate surface disturbance from these developments is expected to total up to 883 acres of short-term disturbance, or up to 428 acres of long-term impacts to vegetation (after reclamation of abandoned and non-productive well pads).

Future development of fluid minerals on currently leased and private surface lands within the Monument, as well as on adjacent lands, may result in impacts similar to those expected from development on BLM lands. These cumulative impacts may be greater if reclamation of short- and long-term disturbances and avoidance of riparian areas are not performed to any standards. Reclamation on private lands is negotiated between the landowner and the oil and gas operators, and may, therefore, be less stringent in terms of plant species composition, cover, and/or structure. Failure to perform adequate reclamation or to avoid riparian/wetland areas may result in indirect impacts to BLM lands through creating a seed source for noxious

weed infestations and/or through contributions to sedimentation in riparian areas. Degradation of these areas may also result in a decrease in the area occupied by native vegetation communities, and in the quality of wildlife habitat and human recreation experience throughout the area.

Table 4-16 Comparison of Impacts to Vegetation Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Upland Vegetation	Not meeting Public Land Health Standards.	Take specific actions to rapidly progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to rapidly progress toward meeting Public Land Health Standards.
Riparian/Wetland Vegetation	Not meeting Public Land Health Standards.	Take specific actions to rapidly progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to rapidly progress toward meeting Public Land Health Standards.
Noxious Weeds	Continued trend of increased frequency, diversity, and density.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.
Special Status Plant Species and Significant Plant Communities	Continued stable degraded or downward trends for habitat quality.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.	Take specific actions to progress toward meeting Public Land Health Standards.
Cultural Resources	Protect cultural sites.	Protect cultural communities, site, and isolated finds.	Protect cultural communities and sites.	Protect cultural communities and sites.	Protect cultural communities and sites.
Fluid Minerals	No impact.	Make up to 880 acres available for	Make up to 3,021 acres available for	Make up to 24,462 acres available for	Make up to 880 acres available for

Table 4-16 Comparison of Impacts to Vegetation Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Rangeland Resources	Permit 8,492 active AUMs; 28 allotments. Not meeting Public Land Health Standards.	Permit 6,437 active AUMs; 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health Standards.	Permit 8,368 active AUMs; 23 allotments. Take specific actions to progress toward meeting Public Land Health Standards.	Permit 8,492 active AUMs; 28 allotments. Take specific actions to progress toward meeting Public Land Health Standards.	Permit 6,437 active AUMs; 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health Standards.
Recreation and Transportation	Manage 149 miles road miles (864 acres of disturbance).	Manage 139 miles road miles (806 acres of disturbance).	Manage 189 miles road miles (1,096 acres of disturbance).	Manage 213 miles road miles (1,235 acres of disturbance).	Manage 169 miles road miles (980 acres of disturbance).
Other Resources: Special Designations	Manage 25,549 acres as WSA. Manage 427 acres as RNA. Manage 0 acres	Manage 25,549 acres as WSA. Manage 5,223 acres for wilderness	Manage 25,549 acres as WSA. Manage 427 acres as RNA. Manage	Manage 25,549 acres as WSA. Manage 427 acres as RNA. Manage	Manage 25,549 acres as WSA. Manage 5,223 acres for wilderness

Table 4-16 Comparison of Impacts to Vegetation Resources

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
	as WSR.	character. Manage 7,826 acres as RNA. Manage 25.3 miles as WSR (suitable).	0 acres as WSR.	0 acres as WSR.	character. Manage 7,826 acres as RNA. Manage 0 acres as WSR.

4.2.9. Visual Resources

The primary goal for visual resources management in the Monument is to manage all activities in a manner that conserves, protects, and enhances the Monument's scenic resources, including extraordinary cultural resources, topography, geology, and biology. The management objectives related to this goal include:

- designate Visual Resource Management (VRM) classes throughout the Monument, based on an inventory of visual resources and management considerations for other uses; and
- manage activities within the Monument to adhere to the VRM Class objectives.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to visual resources.

Direct beneficial impacts to visual resources may include, but are not limited to, those that enhance visual quality through actions that protect resources. Direct adverse impacts may include, but are not limited to, short- or long-term changes to current viewsheds.

4.2.9.1. Evaluation Criteria and Assumptions

Assessment of potential impacts on visual resources may be quantified by comparing possible impairment actions or acres of VRM classes. Where this is not possible, impacts are described in qualitative terms.

Assumptions used in analyzing impacts to visual resources include the following:

- All WSAs are managed as VRM Class I, until such time that Congress makes a determination on their permanent status.
- All units of Hovenweep National Monument within the boundary of the Monument are assigned as VRM Class II 0.5-mile buffer.
- The McElmo Resource Natural Area (RNA) is assigned as VRM Class I.
- The Trail of the Ancients Scenic and Historic Byway is assigned as VRM Class II, with a 0.5-mile buffer.
- Federal lands within the boundary of the Monument were used as the impacts analysis area for individual and cumulative impacts.

4.2.9.2. Alternative Analysis

Impacts to visual resources may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for visual resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, recreation and transportation, air quality, fuels and fire, vegetation, and lands and realty.

Alternative I (No Action Alternative)

Visual Resources Management

Under Alternative I, WSAs and the McElmo RNA (38,598 acres) would be managed in accordance with VRM Class I standards. All other areas would be designated as VRM Class II

(126,643 acres). The visual resources of all areas within the Monument boundary would be managed to preserve natural scenic quality. Surface construction projects would be designed to have low to moderate visual contrast standards.

Cultural Resources Management

Under Alternative I, there would be an NGD/NSO restriction in place around Hackberry/Holly House. Cultural Resource Management Plans would be developed for cultural sites, and would address visual resources. Permanent intrusions, such as canyon-rim cutting (disturbing canyon rims for placement of roads or pipelines, etc.), would be discouraged.

Fluid Minerals Management

Approximately 80 percent of Monument lands are currently leased for fluid minerals development. Under Alternative I, the remaining 20 percent would not be leased and no new wells would be drilled; therefore, there would be no impacts.

Rangeland Resources Management

Under Alternative I, there would be 28 livestock grazing allotments, covering 159,676 acres of the Monument, with a stocking rate of 8,492 AUMs. No new grazing allotments would be authorized. Alternative I may have an adverse impact on visual resources due to the fact that livestock grazing may impact archaeological sites, stream channels, vegetation, and/or other natural resources.

Recreation and Transportation Management

Alternative I would provide a broad range of recreation settings and activities. Specific visual quality objectives and design guidelines would be established for recreation areas. Cross, Cahone, and Squaw/Papoose Canyons would be closed to OHV use. Dispersed recreational camping would be allowed.

Under this alternative, in terms of transportation, grading and surfacing roads would be held to the minimum needed for user-safety. There would be 149 miles of roads open to mechanized, motorized, and/or non-motorized travel. There may be beneficial impacts to visual resources under Alternative I, in relation to recreation and transportation management, due to road closures.

Other Resources Management

Under Alternative I, the Monument would comply with State and Federal air quality standards; therefore, there would be no impacts to visual resources.

Under Alternative I, fire would be allowed in specific areas, based on desirability and feasibility of fire management strategies. Prescribed fire would be allowed in some instances to promote resource values and to protect cultural resources. All burned areas would be evaluated to determine the need for fire rehabilitation. Direct impacts to visual resources under Alternative I may be adverse on both the landscape and on the site-specific scale. These impacts may be considered short-term in most cases, with vegetation expected to return shortly after the burn.

Under Alternative I, in terms of reclamation, native plant species would be emphasized. Measures would be taken to improve vegetation in springs and riparian areas, and efforts to control noxious weed species would continue. Impacts to visual resources under Alternative I, in relation to vegetation resources management, may be beneficial.

Under Alternative I, visual resources would not be a major evaluation factor for landownership adjustments. Major utility corridors would be allowed with stipulations; however, operators would be encouraged to use existing corridors. Existing ROWs would be used as much as

possible, and unused ROWs would be reclaimed. Blasting and/or cutting of canyon rim edges (for the placement of pipelines and/or roads), would be avoided, when possible. Adverse impacts may be expected from site disturbance associated with lands and realty management under Alternative I.

Alternative II

Visual Resources Management

Under Alternative II, WSAs and the McElmo RNA, as well as the proposed RNA expansion, would be managed in accordance with VRM Class I standards (38,598 acres). All other areas would be designated as VRM Class II (126,643 acres). During the performance of any environmental analysis for projects, the visual resource contrast rating system would be used as a guide for analyzing potential visual impacts of the proposal. Projects would be designed to mitigate impacts and would conform to the assigned VRM Class objectives. This alternative may result in direct beneficial impacts to visual resources.

Cultural Resources Management

This alternative would manage for the protection of cultural resource communities, sites, and/or isolated finds, and would protect large blocks of ground from disturbance. Under Alternative II, Cultural Resource Management Plans would be developed for cultural sites, and would address visual resources. Alternative II would allocate 13 sites to Public Use D (Developed). Although this may potentially offer increased opportunities for appreciation of visual resources, it may also result in more ground disturbance as a result of visitor facilities. The areas, however, would be small and facilities would be kept to a minimum; therefore, the overall long-term impact may be beneficial.

Fluid Minerals Management

Under Alternative II, 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative. All temporary access roads for fluid minerals development would be reclaimed. Environmental impact analyses would be required for seismic operations, and the use of bulldozers would be prohibited in seismic operations-related work. Geophysical operations would be limited to BLM-defined roads. New leases would have NGD/NSO, CSU/SSR, TL, and lease notice (LN) stipulations that protect cultural, natural, and scenic resources, and Monument objects. Short-term adverse visual resource impacts associated with fluid minerals development under Alternative II may be mitigated by such restrictions.

Rangeland Resources Management

Under Alternative II, there would be 23 grazing allotments, with a stocking rate of 6,437 AUMs. Common reserve allotments would be established to provide more rest periods for existing allotments. Five livestock grazing allotments would be closed and the McElmo RNA closed to livestock grazing. Where Public Land Health Standards are not being met, streams and riparian areas would be fenced to exclude livestock. Spring grazing would be prohibited. The reduction in AUMS under Alternative II may result in a direct beneficial impact to visual resources due to the restoration of land health.

Recreation and Transportation Management

Alternative II, in terms of recreation management, would promote an undeveloped management strategy, with no additional roads or parking provided. Infrastructure and visitor facilities would be minimized. In Alternative II, all unused roads would be closed and restored within 10 years of the signing of the ROD. There would be 139 miles of roads open to mechanized, motorized,

and/or non-motorized travel. A strategy for enforcing the transportation plan would be developed within 1 year of the signing of the ROD. Both the undeveloped recreation management strategy, and the decrease in available roads, may result in beneficial impacts to visual resources.

Other Resources Management

Under Alternative II, the Four Corners Air Quality Task Force recommendations would be implemented. New and/or replaced wellhead engines and large compressor stations would have emission controls. Measures would be implemented to reduce small particulate matter pollution (i.e., dust) on construction projects. Management actions would be designed in a manner that avoids impacts to scenic vistas in the Monument, and to comply with State requirements for protection of scenic and important vistas. Impacts to visual resources under Alternative II, in relation to air quality, may be beneficial.

Under Alternative II, the entire Monument would be designated as an area where fire is not desired and suppression is emphasized. Fire may, however, be allowed, depending on resource management objectives. Emphasis would be placed on fuel-hazard reduction at prominent cultural resource sites, existing and future major oil and gas facilities, communication sites, and/or all existing and future WUI areas. These activities may result in adverse impacts to visual resources at the individual site scale and at the landscape scale.

Under Alternative II, vegetation would be managed to promote the health of native plant communities. Native vegetation restoration projects would be prioritized and implemented. Weeds would be controlled and seeding would be performed in pinyon-juniper areas that were previously chained. Reclamation plans would be required for all proposed vegetation management projects. Vegetation in riparian areas would be improved and livestock exclusions would be implemented, if necessary. Pine bark beetles would be treated in high-visibility administrative areas to prevent tree mortality. Wildland fire disturbance areas greater than 0.5 acre would be monitored and treated. User-created roads in high-use areas containing biological crust communities would be closed and restored. Direct impacts to visual resources under Alternative II, in relation to vegetation management, may be beneficial.

Under Alternative II, new ROWs would not be permitted in RMZ 5. Only one road would be authorized to access each parcel of private property. Major new utility ROWs, renewable energy facilities, and/or communication sites would be prohibited, and existing ROWs would be used during the construction of new facilities. All new and reconstructed utility lines and/or pipelines would be buried, where possible. Powerlines and towers would be constructed of non-reflective materials, and located away from visual high points. Strobe lights would be prohibited. All new ROW facilities would be required to meet visual resource objectives. Blasting and/or cutting of canyon rim edges (for the placement of pipelines and/or roads) would be avoided, when possible. Stipulations would be put in place for road widths and for reclamation of temporary access roads. Impacts to visual resources under Alternative II, in terms of lands and realty management, may be beneficial.

Alternative III

Visual Resources Management

Under Alternative III, WSAs and the McElmo RNA would be managed in accordance with VRM Class I standards (25,976 acres). The Painted Hand Pueblo, Rock Creek, Sand Canyon Pueblo, Sand Canyon, Goodman Point, Lowry Pueblo RMZs, and lower portions of the Squaw Cross Canyons RMZ would be assigned as VRM Class II. The McElmo RNA and all units of Hovenweep National Monument within the boundary of the Monument would have a 0.5-mile buffer of VRM Class II. The Trail of the Ancients Scenic and Historic Byway would be assigned

a 0.5-mile buffer of VRM Class II. The total VRM Class II acreage would be up to 41,867 acres. All other areas would be designated as VRM Class III (up to 104,605 acres). This alternative may result in adverse impacts to visual resources because fewer acres would be assigned to VRM Classes I and II.

Cultural Resources Management

This alternative would manage for the protection of cultural resource communities and sites, and would protect large blocks of ground from disturbance. Under Alternative III, Cultural Resource Management Plans would be developed for cultural sites, and would address visual resources. Alternative III would allocate 13 to 25 sites to Public Use D (Developed). Although this may potentially offer increased opportunities for appreciation of visual resources, it may also result in more ground disturbance as a result of visitor facilities. Developed sites would be small in size, with unobtrusive facilities.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres would be available for new fluid minerals development. Acreage disturbed for new access roads and drill pads would be up to 73 acres. All temporary access roads for fluid minerals development would be reclaimed. Environmental impact analyses would be required for seismic operations. Geophysical operations would be limited to BLM-defined roads in riparian areas only. New leases would have NGD/NSO, CSU/SSR, TL, and LN stipulations that protect cultural, natural, and scenic resources, and Monument objects. Short-term adverse visual resource impacts associated with fluid minerals development under Alternative III may be mitigated by such restrictions.

Rangeland Resources Management

Under Alternative III, common reserve allotments would be established to provide more rest periods for existing grasslands. Streams and riparian areas where Public Land Health Standards are not being met would be fenced to exclude livestock. Spring grazing stipulations would be less strict than those proposed under Alternative II. Five grazing allotments would be closed. The McElmo RNA would be closed to livestock grazing between November 15 and March 15. The stocking rate for the Monument would be 8,368 AUMs. Alternative III may result in some beneficial impacts to visual resources.

Recreation and Transportation Management

Alternative III, in terms of recreation management, would promote a destination management strategy, with six new parking areas developed. Under Alternative III, all unused roads would be closed, with no defined timetable for restoration. The Lower Sand Canyon parking area would be expanded. There would be 189 miles of roads open to mechanized, motorized, and/or non-motorized travel. There would not be a defined timetable for developing a strategy to enforce the transportation plan. Alternative III, in relation to recreation and transportation management, may result in adverse impacts to visual resources due to the increase in parking areas and road miles.

Other Resources Management

Under Alternative III, the Four Corners Air Quality Task Force recommendations would be implemented. New or replaced wellhead engines and large compressor stations would have emission controls. Measures would be implemented to reduce small particulate matter pollution (i.e., dust) on construction projects. Management actions would be designed in a manner that avoids impacts to scenic vistas in the Monument, and would comply with State requirements for the protection of scenic and important vistas. Impacts to visual resources under Alternative III, in relation to air quality, may be beneficial.

Under Alternative III, the entire Monument would be designated as an area where fire is not desired and suppression is emphasized. Fire may, however, be allowed in each area, depending on resource management objectives. Impacts to visual resources under Alternative III, in relation to fuels and fire management, may be adverse, but considered short-term.

Under Alternative III, vegetation would be managed to promote the health of native plant communities. Native vegetation restoration would be conducted on a project level. Weeds would be controlled and seeding would be performed in pinyon-juniper areas that were previously chained. Reclamation plans would be required for all proposed vegetation management projects. Vegetation in riparian areas would be improved and livestock exclusions would be implemented, if necessary. Pine bark beetles would be treated in high-visibility administrative areas to prevent tree mortality. User-created roads in high-use areas containing biological crust communities would be closed and restored. Direct impacts to visual resources under Alternative III, in relation to vegetation management, may be beneficial.

Major new utility ROWs would be allowed only within, or adjacent to, the existing aerial powerline in the southwestern corner of the Monument. Renewable energy facilities and/or communication sites would be located based on the determinations of a feasibility study, and communication providers would be required to share towers. Existing ROWs would be used during the construction of new facilities. All new and reconstructed utility lines and/or pipelines would be buried, where possible. Powerlines and towers would be constructed of non-reflective materials, and located away from visual high points. Strobe lights would be prohibited. All new ROW facilities would be required to meet visual resource objectives. Blasting and/or cutting of canyon rim edges (for the purpose of pipeline and/or road placement) would be avoided, when possible. Stipulations would be put in place for widths and reclamation on temporary access roads. Impacts to visual resources under Alternative III, in relation to lands and realty management, may be beneficial.

Alternative IV

Visual Resources Management

Under Alternative IV, WSAs and the McElmo RNA would be managed in accordance with VRM Class I standards (25,976 acres). The Lowry Pueblo, Squaw Cross Canyons, Painted Hand Pueblo, and Sand Canyon Pueblo RMZs would be assigned as VRM Class II. The McElmo RNA and all units of Hovenweep National Monument within the boundary of the Monument would have a 0.5-mile buffer of VRM Class II. The Trail of the Ancients Scenic and Historic Byway would be assigned a 0.5-mile buffer of VRM Class II. Total Class II acreage would be 27,535 acres. Mockingbird Mesa, Rock Creek, Sand Canyon, and Goodman Point RMZs would be designated as VRM Class III (94,327 acres). Rincon RMZ would be VRM Class IV (17,497 acres). This alternative may result in direct adverse impacts to visual resources due to the less stringent Class III and Class IV requirements.

Cultural Resources Management

This alternative would manage for the protection of cultural resource communities and sites, and would protect large blocks of ground from disturbance. Under Alternative IV, Cultural Resource Management Plans would be developed for cultural sites, and would address visual resources. Alternative IV would allocate 13 to 25 sites to Public Use D (Developed). Although this may potentially offer increased opportunities for appreciation of visual resources, it may also result in more ground disturbance as a result of visitor facilities. This impact may be minor, however, given the few number of proposed sites and the unobtrusive nature of the development.

Fluid Minerals Management

Under Alternative IV, up to 24,462 acres would be available for leasing. A total of up to 447 acres of new ground disturbance would be possible under this alternative. All temporary access roads for fluid minerals development would be reclaimed. Environmental impact analyses would be required for seismic operations. Geophysical operations would be permitted to travel throughout the Monument, but could cross riparian areas only in authorized locations. New leases would have NGD/NSO, CSU/SSR, TL, and LN stipulations that protect cultural, natural, and scenic resources, and Monument objects. Short-term adverse visual resource impacts associated with fluid minerals development under Alternative IV may be mitigated by restrictions.

Rangeland Resources Management

Under Alternative IV, common reserve allotments would be established to provide more rest periods for existing grasslands. Streams and riparian areas where Public Land Health Standards are not being met would be fenced to exclude livestock. Spring livestock grazing stipulations would be less strict than those proposed under Alternative II would. There would be no livestock grazing restrictions in the McElmo RNA. More acres of the Monument may be available for livestock grazing, and the stocking rate would be 8,492 AUMs. Alternative IV may improve visual quality through improved land health; however, it may occur very slowly, if at all.

Recreation and Transportation Management

Alternative IV, in terms of recreation management, would promote a destination management strategy, with more visitors expected and existing parking areas enlarged. Under Alternative IV, most user-created roads would remain open. There would be 213 miles of roads open to mechanized, motorized, and/or non-motorized travel. There would not be a defined timetable for the development of a strategy to enforce the transportation plan. Alternative IV, in relation to recreation and transportation management, may result in adverse impacts to visual resources due to the increase in facilities and roads.

Other Resources Management

Under Alternative IV, the Four Corners Air Quality Task Force recommendations would be implemented. New or replaced wellhead engines and large compressor stations would have emission controls. Measures would be implemented to reduce small particulate matter pollution (i.e., dust) on construction projects. Management actions would be designed in a manner that avoids impacts to scenic vistas in the Monument and would comply with State requirements for the protection of scenic and important vistas. Impacts to visual resources under Alternative IV, in relation to air quality, may be beneficial.

Under Alternative IV, the entire Monument would be designated as an area where fire is not desired and suppression is emphasized. Fire may be allowed, depending on resource management objectives. Impacts to visual resources under Alternative IV, in relation to fire management, may be adverse; however, they may be considered short-term, until vegetation returns.

Under Alternative IV, vegetation would be managed to promote the health of native plant communities. Native vegetation restoration would be conducted on a project level. Weeds would be controlled and seeding would be performed in pinyon-juniper areas that were previously chained. Reclamation plans would be required for all proposed vegetation management projects. Vegetation in riparian areas would be improved and livestock exclusions would be implemented, if necessary. Bark beetle infestations would be treated at a rate of 1,000 acres per year. User-created roads in high-use areas containing biological crust

communities would be closed and restored. Direct impacts to visual resources under Alternative IV, in relation to vegetation management, may be beneficial.

Major new utility ROWs would be allowed only within or adjacent to, the existing aerial powerline in the southwest corner of the Monument. Renewable energy facilities and/or communication sites would be located based on the determinations of a feasibility study, and communication providers would be required to share towers. Existing ROWs would be used during the construction of new facilities. All new and reconstructed utility lines and/or pipelines would be buried, where possible. Powerlines and towers would be constructed of non-reflective materials, and located away from visual high points. Strobe lights would be prohibited. All new ROW facilities would be required to meet visual resource objectives. Blasting and/or cutting of canyon rim edges (for the purpose of road and/or pipeline construction) would be avoided, when possible. Stipulations would be put in place for widths and reclamation on temporary access roads. Impacts to visual resources under Alternative IV, in terms of lands and realty management, may be beneficial.

Alternative V (Preferred Alternative)

Visual Resources Management

Under Alternative V, WSAs and the McElmo RNA (38,598 acres) would be managed according to VRM Class I standards. All other areas would be designated as VRM Class II (126,643 acres), except for 94 acres in VRM Class III. The visual resources of the Monument would be managed to preserve natural scenic quality. While surface construction projects would be allowed, their design would be required to have no more than low to moderate visual contrast. This may result in direct beneficial impacts to visual resources.

Cultural Resources Management

This alternative would manage for the protection of cultural resource communities and sites, and would protect large blocks of ground from disturbance. In Alternative V, Cultural Resource Management Plans would be developed for cultural sites and would address visual resources. Permanent intrusions, such as canyon rim cutting, would be prohibited. Alternative V would allocate 13 to 25 sites to Public Use D (Developed). Although this may potentially offer increased opportunities for appreciation of visual resources, it may also result in more ground disturbance as a result of visitor facilities. These sites, however, would be small and unobtrusive; therefore, impacts may be minor.

Fluid Minerals Management

Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative. All new lease offerings would include NSO stipulations that protect cultural and scenic resources. There would be no leasing in WSAs. All temporary access roads for seismic exploration would be reclaimed. Environmental impact analyses would be required for seismic operations, and the use of bulldozers would be prohibited in seismic operations-related work. New leases would have NSO, CSU, TL, and LN stipulations that protect cultural, natural, and scenic resources, and Monument objects. Short-term adverse visual resource impacts associated fluid minerals development under Alternative may be mitigated by such restrictions.

Rangeland Resources Management

Under Alternative V, common reserve allotments would be established to provide more rest periods for existing grasslands. Streams and riparian areas where Public Land Health Standards are not being met would be fenced to exclude livestock. Five livestock grazing allotments would be closed: East Sand Canyon, West Sand Canyon, Rock Creek, Goodman

Gulch, and Trail Canyon. Livestock grazing in the McElmo RNA would be limited to November 15 through March 15. The stocking rate would be 6,437 AUMs. Alternative V may result in a direct moderate beneficial impact to visual resources due to restoration of land health.

Recreation and Transportation Management

Alternative V would have day-use as the primary recreational focus. Five RMZs would have an undeveloped management strategy. Three RMZs would have a regional destination management strategy, and two RMZs would have a national and international destination management strategy. Camping and campfires would not be permitted in four RMZs, but would be allowed in four other RMZs. Rock climbing would be allowed in designated sites. Although Alternative V recreation management may potentially offer increased opportunities for appreciation of visual resources, it may also result in more ground disturbance as a result of visitor facilities.

Under Alternative V, most user-created roads would be closed and restored within 10 years of the signing of the ROD. A strategy for enforcing the transportation plan would be developed within 1 year of the signing of the ROD. New travel roads would be prohibited in Squaw and Cross Canyons and within the McElmo RNA. There would be 169 miles of roads designated for mechanized, motorized, and/or non-motorized travel.

Other Resources Management

Under Alternative V, the Four Corners Air Quality Task Force recommendations would be implemented. New or replaced wellhead engines and large compressor stations would have emission controls. Measures would be implemented to reduce small particulate matter pollution (i.e., dust) on construction projects. Management actions would be designed in a manner that avoids impacts to scenic vistas in the Monument and would comply with State requirements for the protection of scenic and important vistas. Impacts to visual resources from Alternative V, in relation to air quality, may be beneficial.

Under Alternative V, the entire Monument would be designated as an area where fire is not desired and suppression is emphasized. These activities may result in adverse impacts to visual resources at the individual site scale and at the landscape scale, but may be considered short-term, until vegetation returns.

Under Alternative V, vegetation would be managed to promote the health of native plant communities. Native vegetation restoration projects would occur mainly on a project basis. Weeds would be controlled and seeding would be conducted in pinyon-juniper areas that were previously chained. Vegetation in riparian areas would be improved and livestock exclusions would be implemented, if necessary. Bark beetles would be treated in high-visibility administrative areas to prevent tree mortality. Impacts to visual resources under Alternative V, in terms of vegetation management, may be beneficial.

Under Alternative V, only one road would be authorized to access each parcel of private property. Major new utility ROWs would be prohibited. Existing ROWs would be used during the construction of new facilities. Communications providers would be encouraged to share existing facilities. All new ROW facilities would be required to meet visual resource objectives. Blasting and/or cutting of canyon rim edges (to place roads and/or pipelines) would be prohibited. Indirect impacts to visual resources under Alternative V, in terms of lands and realty management, may be beneficial.

4.2.9.3. Visual Resources Management Impact Comparison

The visual resources impact comparison is presented in Table 4-17. This table compares the consequences of resource management actions under each alternative on visual resources.

4.2.9.4. Cumulative Impacts

The greatest threat to visual quality within the Monument is fluid minerals development on private lands, as well as on existing leases on Federal lands in and around the Monument. Increased development may include well pads, pipelines, compressor stations, roads, and/or other facilities, and may result in ground disturbance. Mineral development may impact air quality as the result of substances being released into the atmosphere. On private land, mineral development is not subject to the BLM BMPs, or to other mitigation measures.

Table 4-17 Comparison of Impacts to Visual Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Visual Resources	Manage 25,976 acres as VRM Class I. Manage 139,359 acres as VRM Class II.	Manage 38,598 acres as VRM Class I. Manage 126,643 acres as VRM Class II. Manage 94 acres as VRM Class III.	Manage 25,976 acres as VRM Class I. Manage 41,867 acres as VRM Class II. Manage 104,605 acres as VRM Class III.	Manage 25,976 acres as VRM Class I. Manage 27,535 acres as VRM Class II. Manage 94,327 acres as VRM Class III. Manage 17,497 acres as VRM Class IV.	Manage 38,598 acres as VRM Class I. Manage 126,643 acres as VRM Class II. Manage 94 acres as VRM Class III.
Cultural Resources	Develop new sites for controlled visitation. Protect cultural sites.	Develop 13 sites. Protect cultural resource communities, sites, and isolated finds.	Develop 13 to 25 sites. Protect cultural resource communities and sites.	Develop 13 to 25 sites. Protect cultural resource communities and sites.	Develop 13 to 25 sites. Protect cultural resource communities and sites.
Fluid Minerals	No Impact.	Make up to 880 new acres available for lease. Allow up to 2 new well pads, 1 mile road. Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 3,021 new acres available for lease. Allow up to 8 new well pads, 3 miles road. Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 24,462 new acres available for lease. Allow up to 59 new well pads, 19 miles road. Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.	Make up to 880 new acres available for lease. Allow up to 2 new well pads, 1 mile road. Apply NGD/NSO, CSU/SSR, TL, and COA restrictions.
Rangeland Resources	Not meeting Land Health Standards. Permit 8,492 AUMs.	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Permit 6,437 AUMs.	Take specific actions to progress toward meeting Public Land Health Standards. Permit 8,368 AUMs.	Take specific actions to progress toward meeting Public Land Health Standards. Permit 8,492 AUMs.	Take specific actions to rapidly progress toward meeting Public Land Health Standards. Permit 6,437 AUMs.

Table 4-17 Comparison of Impacts to Visual Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Recreation and Transportation	Manage 149 miles of roads.	Manage 139 miles roads.	Manage 189 miles of roads.	Manage 213 miles of roads.	Manage 169 miles of roads.
Other Resources: Air Quality	Comply with State and Federal air quality standards.	Comply with State and Federal air quality standards; additional requirements and protective measures.	Comply with State and Federal air quality standards; additional requirements and protective measures.	Comply with State and Federal air quality standards; additional requirements and protective measures.	Comply with State and Federal air quality standards; additional requirements and protective measures.
Other Resources: Fuels and Fire	More likely to have large-scale fires.	Fires generally site-specific and short-term.			
Other Resources: Vegetation Resources	Restore native plant species.	Restore native plant species. Allow proactive noxious weed management.	Restore native plant species. Manage noxious weeds as encountered.	Allow use of non-native plant species for revegetation. Manage noxious weeds as encountered.	Restore native plant species. Allow proactive noxious weed management.
Other Resources: Lands and Realty	Allow major utility corridors, with protective stipulations.	Prohibit major utility ROW corridors.	Allow major utility ROW corridors only within or adjacent to existing ROWs.	Allow major utility corridors, with protective stipulations.	Prohibit major utility ROW corridors.

4.2.10. Water Resources

The primary goal for water resources management is to ensure that an appropriate quality and quantity of water are available to support the proper functioning of ecological processes, consistent with applicable standards (e.g., water quality). The management objectives related to this goal include:

- protect and restore water resources from physical disturbances and adverse impacts associated with land management activities;
- ensure continued availability of water to adequately manage resources and multiple-uses (multiple-uses include both consumptive uses of water, such as livestock, wildlife watering, recreation, and fire suppression, as well as non-consumptive uses, such as flow in streams sufficient to support riparian and fisheries values);
- protect water quality within and downstream from the Monument; and
- identify and quantify hydrologic processes and relationships, and monitor changes in both water quality and quantity to ensure proper management of resources, as well as the multiple-uses that depend on them.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts to water resources.

Beneficial impacts that improve water quality may include actions that reduce and/or eliminate sedimentation and contamination factors. Beneficial indirect impacts may include increased vegetative cover, reduced soil compaction, and reduced disturbance to the soil's biological crust (which may result in less soil erosion and surface runoff and in greater water absorption and infiltration). Water quantity may be enhanced by irrigation inflow upstream. Beneficial impacts may also be described in terms of protective measures, such as the designation of wild and scenic rivers. Adverse impacts to water quality include sedimentation (which can be a result of ground disturbance as well as with associated runoff). Water contamination may result from direct deposition of fecal material and/or chemicals, such as from pesticides and/or herbicides. Water quantity may be reduced from stream diversions for irrigation, culinary, and/or other uses.

Direct impacts to water may involve the introduction of pollution directly into the water or at the water source. Indirect impacts may result from a loss of vegetation (which reduces water infiltration into the ground).

Potential impacts to surface waters from fluid minerals extraction may include soil disturbance resulting in sediments washing and/or blowing into nearby streams; contaminated runoff from project wells entering streams and/or groundwater; and contaminants spilling, leaking, and/or being washed off vehicles and equipment and into streams at road crossings. In addition, the depletion of surface water may result from drilling and cross-connection of water-bearing zones that may be tributary to surface water.

Potential impacts to groundwater from the management of fluid minerals may include, but are not limited to, the cross-contamination of aquifers across geologic strata due to the improper sealing of aquifers encountered by the well bore, the contamination of shallow water aquifers due to surface spills and/or accidental releases, and the leakage of fluids during the transfer and/or transportation of produced water.

The actual impacts on surface water and groundwater quality may depend on the proximity of roads, pads, and/or of support facilities to water sources; the magnitude, duration, and intensity

of precipitation events (which can influence the volume of contaminated runoff reaching streams); well completion techniques; and the BMPs used for stormwater pollution control. Wells sited away from actively flowing surface water may have a lower risk of impacting water resources. Potential impacts may be greatest during project construction. Long-term impacts, such as surface water depletion, may occur during well operations.

With appropriate mitigation measures in place, the risk of contaminating surface water and/or groundwater during the management of fluid minerals may be low. When proper procedures are followed, accidental spills may be rare and usually may be contained. Implementing BMPs, such as inspecting vehicles frequently for leaks and lining reserve pits, may greatly reduce the risk of potential contaminants reaching water resources.

Livestock may impact water quality due to increasing sedimentation in streams and to direct contamination at springs. Livestock may increase the amount of sediment entering surface water due to the removal of riparian vegetation and the disturbance of stream banks. Sedimentation may alter the levels of dissolved oxygen, pH, and nitrite concentration in the stream. The impact of continued livestock management on sedimentation may be localized and long-term. Water quality contamination from direct contact of livestock with streams and springs may have a short- to long-term impact, depending on the quantity and the nature of the contaminants. Primary contaminants obtained from direct contact may include bacteria and/or ammonia. Contaminated water from livestock may extend downstream into mainstem streams during peak flow events. Restricting the access of livestock to surface water may greatly reduce the risk of direct contamination.

Livestock grazing may indirectly impact water quality and stream channel conditions due to the removal of upland vegetation, the compaction of soil, and/or the disturbance of biological soil crust. The removal of vegetation and/or biological soil crust in upland areas may increase the potential for soil erosion due to the exposure of soil to wind and water. Additionally, removing vegetation may increase the volume and/or velocity of surface runoff due to the reduction of friction on the ground surface. Friction may be further reduced due to soil compaction. An intact biological soil crust may help to reduce soil erosion (by covering the soil and binding soil particles together) and aid in the infiltration and absorption of rainfall. Consequently, areas that are heavily grazed may quickly transport soil sediment downhill into adjacent streams. The potential for sedimentation from upland livestock grazing may depend on the frequency, magnitude, and/or the timing of runoff events; watershed condition; number of livestock; proximity of livestock to surface water; season of use; and/or the duration of grazing. The indirect impacts of sedimentation on water resources, under the current regime, may be moderate and long-term.

Livestock watering may reduce base flows at the watering source. The amount of water withdrawn would depend on the number of cattle, the grazing season, and the method of extraction. A large amount of livestock receive water from small artificial ponds fed by storm flow and snowmelt. Livestock grazing may also alter stream channel shape due to an increase in the volume and rate of surface water reaching the stream (which can scour stream banks), an increase in the amount of sediment being deposited into the stream, the collapse of stream banks to access water, and the removal of stabilizing riparian vegetation adjacent to water sources. These processes tend to increase stream width, decrease its depth, and decrease its sinuosity (curvature). A straight, shallow stream is more likely to increase in water temperature. Temperature increases may be compounded by the removal of riparian vegetation (which shades the stream). Warming streams may create adverse habitat conditions for aquatic vegetation and/or wildlife. These physical changes are already occurring on some streams in the Monument. Continued livestock grazing would likely continue this trend, producing a long-term change in stream channel function and/or habitat.

Differing types of recreation may have varying levels of impacts on water resources. Temporary, localized impacts to water quality may occur during visitor facility construction due to soil disturbance and increased equipment traffic. Long-term impacts may result from the installation of some permanent features, such as parking lots. This may increase the amount of surface runoff reaching adjacent streams. Water usage for facilities, such as for drinking water pipelines, restrooms, and/or for kitchen use, may have a minor impact on water quantity. The impacts of facilities on water resources may diminish with distance from the water source.

Dispersed foot traffic may have a minimal impact on water resources, unless visitors waded directly into stream channels. The amount of expected foot traffic at any given time in the Monument would likely be too low to produce measurable impacts on stream channels. OHV use may have a large impact on water resources, especially if designated OHV roads cross stream valleys. OHVs may displace large amounts of soil and create soil ruts, which, in turn, can funnel runoff and sediment into nearby streams. Soil loss due to rainfall and/or runoff is increased when cyanobacteria connections in the soil crust are broken. This may be particularly problematic when the impact is in a continuous strip, such as in vehicle tracks. This is because channels for water flow are quickly formed, especially on slopes. Depending on their proximity and surfacing, high-traffic roads may contribute substantial amounts of sediment into streams. Traffic along natural surfaced roads may continue to displace sediment, both during active use and while not in use. If the road surface is hardened (rocked or paved), then the risk of sedimentation may be greatly reduced; however, the risk of surface runoff may increase slightly. Road construction activities may displace topsoil that could then, potentially, enter nearby streams during runoff events. Depending on their proximity to surface water, the construction of new roads may have a long-term impact on water resources.

4.2.10.1. Evaluation Criteria and Assumptions

Quantifying impacts to water resources, specifically for water quality, is difficult due to a lack of long-term data for water resources in the Monument. The number of acres of ground disturbance may be used as a relative comparison of alternatives, as an indication of potential for water quality deterioration due to sedimentation. In the case of analyzing impacts from livestock grazing, the number of AUMs may be used to compare alternatives and the potential for impacts from ground disturbance and direct water contamination. Impacts are sometimes described in qualitative terms, if appropriate.

Assumptions used in analyzing impacts to water resources include the following:

- Application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E).
- The analysis assumed the implementation of all possible management actions under each alternative (representing a “worst-case scenario”). Therefore, the actual impacts of implementing each alternative are likely to be less and within the scope of the analysis presented below.
- It is assumed that the number of roads predicted for construction, based on new acres leased for fluid minerals development, would all be new roads.
- Erosion can be expected from the majority of soil types present in the Monument, most of which are characterized as having severe water erosion and high runoff properties.
- The spatial scales considered for direct and indirect impacts include the site of the proposed management actions, the general vicinity of proposed management actions

(including the nearest water bodies), and the catchment scale (the impacted stream valley or basin).

- Cumulative impacts are considered in the Monument and at the fifth-field watershed scale. The Monument makes up 56 percent of the Yellow Jacket Canyon fifth-field watershed, 30 percent of the Middle McElmo Creek watershed, 24 percent of the Cross Canyon watershed, 21 percent of the Lower McElmo Creek watershed, and only 3 percent of the Upper McElmo watershed. Consequently, the Yellow Jacket Canyon watershed would most likely be impacted by management direction in the Monument; whereas, the Upper McElmo watershed is more likely to be impacted by the activities of other landowners in the watershed. The temporal scale of impacts ranges from minutes to decades or longer.

4.2.10.2. Alternative Analysis

Impacts to visual resources may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for water resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, recreation and transportation, and other resources.

Alternative I (No Action Alternative)

Water Resources Management

Under Alternative I, the BLM would honor existing water rights in the Monument. New water rights may be secured to provide for recreation, livestock, and/or for the protection of riparian zones or springs associated with cultural sites. The Dolores Water Conservancy District (DWCD), the Montezuma Valley Irrigation Company (MVIC), and other entities that import water to the watersheds in which the Monument is located are increasing the water flow in the Monument. If the current trend of returning irrigation flows continues, the surface water and near-surface water features in the Monument should continue to have larger flows over natural conditions. These augmented water features may continue to provide riparian habitats and water for other uses, such as for wildlife, livestock, and/or for recreation.

Alternative I would protect 2,415 acres of riparian system and would implement projects designed to improve riparian and alluvial floodplain habitat. Active channel edges would be protected from non-restoration projects, unless appropriate mitigation measures were in place to reduce or eliminate impacts to streams. There are no restrictions on groundwater and/or new water developments.

Under Alternative I, existing stream crossings would be assessed, and replaced or repaired, if needed, to maintain water quality and stream function. Road crossings of intermittent or perennial streams would be reviewed on a case-by-case basis. Removing or improving stream crossings may have a long-term beneficial impact on water resources in that such actions may reduce potential sedimentation and may help to maintain or restore channel condition and function.

Cultural Resources Management

The continued management of cultural resource sites for visiting, interpretation, and/or research may have a negligible impact on water resources. Sediment produced as a result of ground-disturbing activities (e.g., facility construction or traffic) may be short-term, minor, and localized. The majority of known cultural sites are located on uplands, away from perennial streams, and visitation to these sites may have minimal to no measurable impact on streams or groundwater

resources. Alternative I identifies 240 sites for stabilization, several of which would be developed for visitation and may increase the potential for disturbance.

In order to help protect existing spring riparian areas that are associated with cultural sites, the BLM would obtain water rights for these areas. This may have a long-term beneficial impact on these special habitats in that these actions may help maintain flows sufficient for sustaining riparian-dependent species.

Fluid Minerals Management

Under Alternative I, no new fluid minerals leases would be allowed; therefore, no new ground disturbance would occur associated with new mineral leases. Existing leases would continue. Fluid minerals management is not anticipated to have impacts to water resources under Alternative I.

Rangeland Resources Management

The continued management of 8,492 active livestock AUMs in the Monument may impact water quantity and quality. Under Alternative I, the BLM would secure sufficient water rights to provide for livestock management needs. Livestock watering would slightly reduce base flows at the watering source. The amount of water withdrawn would depend on the number of cattle, the grazing season, and/or the method of extraction. Therefore, the impact of livestock on water quantity may be minor because flows in the Monument are currently augmented by irrigation returns.

Alternative I, the No Action Alternative, has failed to meet Public Land Health Standards to date. Livestock grazing is a key component of that failure. Not maintaining rangeland health would continue to impact water sources due to the lack of ground cover, healthy vegetation, and associated erosion and sedimentation into local streams. In addition, this alternative does not protect water sources to the same extent they would be protected under the other alternatives; therefore, impacts to riparian areas, floodplains, and/or canyon bottoms may continue. Livestock management under this alternative has the greatest potential to adversely impact water resources.

Recreation and Transportation Management

This alternative does not have a recreation promotion strategy. Facility development would be on an as-needed basis. The actual level of impact would depend on the maintenance and construction of visitor facilities, the proximity of these facilities to water bodies, the types of recreation use, and the number of visitors. In addition, differing types of recreation would have varying levels of impacts on water resources. Dispersed foot and horseback traffic may have a minimal impact on water resources, unless visitors waded directly into stream channels. The amount of expected foot and horseback traffic at any given time in the Monument may be too low to produce measurable impacts to channels. This would not be the case with dispersed traffic. However, cross-country OHV travel would be prohibited in the Monument and there may be no impact.

Traffic along the 149 miles of roads (both motorized, non-motorized, and/or mechanized) may result in localized, long-term soil disturbance and displacement (864 acres). This alternative does not incorporate official travel management designations; therefore, it may not manage traffic to the same extent as the other alternatives, in order to minimize impacts to water resources. The low density of roads in the Monument and the expected volume of visitor traffic may likely have minor impacts on water resources.

The closing of roads may have a long-term beneficial impact on water resources as a result of reducing the volume of traffic and returning the land to a more natural surface. Although

residual road compaction may persist for decades, former roads that are reclaimed by vegetation may regain some of their infiltration and runoff dispersal functions following a single growing season. Decompacting and/or recontouring roads may greatly accelerate their recovery.

Alternative II

Water Resources Management

Alternative II may have a long-term beneficial impact on water quantity and quality in the Monument. Under Alternative II, the BLM would acquire water rights to support all water uses in the Monument (both consumptive and non-consumptive). Existing water rights would be honored and new surface water and groundwater developments would only be issued to mitigate environmental impacts, restore native habitats and/or populations, support visitor facilities, and/or to mitigate impacts to cultural resources. New developments would only be implemented following a NEPA analysis of potential impacts, and then only when the development would not dewater springs or streams. Groundwater developments would be discouraged, and would only be implemented following a full impact analysis of the proposal on water resources.

Under Alternative II, the BLM would work with the owners of existing water infrastructure to reduce the facilities' impacts on riparian habitat. Additionally, new diversions through existing facilities would only be allowed where NEPA analysis demonstrates an overall benefit to Monument resources. The BLM would also work closely with the Colorado Water Conservation Board to establish instream flow rights for suitable perennial and seasonal streams in the Monument. On unprotected reaches, the BLM would only authorize new land uses that would ensure sufficient flows remained to support water-dependent values. Additionally, the BLM would increase water flows by removing noxious weeds in and around seeps, springs, and streams when projects are performed at water sources.

With these management actions in place, and assuming the current trend of returning irrigation flows continues, the surface water and near-surface water features in the Monument may continue to have larger flows over natural conditions. These augmented water features may continue to sustain riparian habitats and provide water for other uses, such as wildlife, livestock, and/or for recreation.

Alternative II would have a greater long-term beneficial impact on riparian systems in that it would protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Under this alternative, the BLM would apply an NGD/NSO restriction to riparian and wetland habitat, including springs, canyon bottoms, and floodplains associated with all stream types. These restrictions may help maintain and enhance riparian areas, which, in turn, may help filter sediment, encourage the infiltration of surface runoff, help stabilize stream banks, and provide shade to regulate stream temperature, among other functions. Additional information regarding impacts to riparian areas is provided in Subsection 3.1.8, Vegetation Resources.

Water contamination at road and trail crossings typically results from sediment being dislodged from the road surface or the vehicle, and, to a lesser extent, from the leakage or spill of fluids and chemicals from vehicles and equipment. Under Alternative II, designated road crossings would be permitted in the NGD/NSO riparian areas only if an analysis demonstrated that the crossing would not contribute to a stream segment either not achieving, or not making progress toward achieving PFC. This management action may help to minimize the risk of water quality contamination at stream crossings.

Cultural Resources Management

Alternative II would identify the development of 13 cultural sites for public use, interpretive signage, infrastructure, and/or visitor services. Sediment produced by ground-disturbing activities (facility construction and traffic) would be short-term, minor, and localized. The majority of known cultural sites are located on uplands, away from perennial streams, and visitation to these sites may have minimal to no measurable impact on streams or groundwater resources.

In order to help protect existing spring riparian areas that are associated with cultural sites, the BLM would obtain water rights for these areas. This may have a long-term beneficial impact on these special habitats in that these actions may help maintain flows sufficient for sustaining riparian-dependent species.

Fluid Minerals Management

The management of fluid minerals may have long-term impacts on water resources. Under Alternative II, up to 880 acres would be available for new leases, but only to accommodate drainage issues. This may result in up to an estimated 18 acres of ground disturbance associated with new leases. Existing leases would continue and would not be affected. This level of development may likely have minor adverse impacts, if managed properly.

Rangeland Resources Management

Alternative II may have a long-term, beneficial impact on water resources in the Monument. Emphasizing a reduction of authorized livestock use to 6,437 active AUMs, adjusting the duration and extent of spring livestock grazing, and implementing rest-rotation grazing schedules may help to improve water and riparian resources throughout the Monument. The benefits of these management actions may include increased vegetative cover, reduced soil compaction, and/or reduced disturbance to the soil's biological crust. This may result in less soil erosion and surface runoff and in greater water absorption and infiltration. As a result, less sediment would be deposited into streams, resulting in additional benefits to water quality, such as increased dissolved oxygen and decreased nitrite concentrations. If livestock are restricted from direct access to surface water, direct water contamination and the loss of riparian vegetation (and the resulting channel changes) may be minimal to none.

Livestock watering may slightly reduce base flows at the watering source. The amount of water withdrawn would depend on the number of cattle, the grazing season, and/or the method of extraction. A large number of livestock receive water from small artificial ponds fed by storm flow and snowmelt. Under Alternative II, new water developments would only be allowed if they resulted in no adverse impacts to water resources, and if they would not dewater streams or springs. Therefore, the impact of livestock on water quantity may be minor due to the fact that flows would be maintained through water resource management.

Implementing the management actions under Alternative II may also have a beneficial impact on stream channel shape in that such actions may eliminate or reduce the processes that are altering stream channels in the Monument. By protecting upland vegetation (and thereby decreasing surface runoff and sedimentation), excluding livestock from stream banks (when movement toward achieving PFC has not been realized using other methods), and protecting riparian vegetation, Alternative II may help to reverse adverse processes and may allow for the recovery of channels toward achieving PFC.

Recreation and Transportation Management

This alternative designates RMZs and SRMAs, and has a strategy of promoting undeveloped recreation opportunities, with minimal facilities and infrastructure, primarily for local visitors.

Under this alternative, water usage for a limited number of facilities may have a minor impact on water quantity, and the impacts of facilities on water resources may diminish with distance from the water source. This alternative would minimize facility construction; therefore, it may benefit water resources more than the other alternatives.

Differing types of recreation would have varying levels of impacts on water resources. Dispersed foot traffic may have a negligible impact on water resources, unless visitors waded directly into stream channels. The amount of expected foot traffic at any given time in the Monument may be too low to produce measurable impacts to channels. Off-road OHV traffic would be prohibited in the Monument; therefore, the OHV contribution to sedimentation would be combined with that of other road use.

Traffic along the 139 miles of roads (both motorized, non-motorized, and/or mechanized) may result in localized, long-term soil compaction and displacement (806 acres). Under Alternative II, most existing user-created roads would be closed and reclaimed and less than half of the existing miles of roads would be open to public use. A lower density of roads in the Monument, with the expected volume of visitor traffic, may likely have very few adverse impacts on water resources.

Depending on their proximity to surface water, the construction of new roads may have a short-term, localized impact on water resources. However, because no new road construction is proposed under Alternative II, and only minor rerouting may occur, the impacts of road construction on water resources may be negligible.

Road closures may have a long-term beneficial impact on water resources, in that such actions may reduce the volume of traffic and return the land to a more natural surface. Although residual road compaction may persist for decades, former roads that are reclaimed by vegetation may regain some of their infiltration and runoff dispersal functions following a single growing season. Decompacting and/or recontouring roads may greatly accelerate their recovery.

Alternative III

Water Resources Management

Under Alternative III, new surface and/or groundwater developments would be encouraged to meet livestock and wildlife management objectives, or redeveloped to reduce impacts to cultural resources. Recreation water developments may be restricted to high-usage areas. After completion of a thorough impact analysis, groundwater development would be allowed in areas of inadequate surface water supplies to meet livestock and wildlife needs. Existing facilities would continue to operate under their historic authorizations, and increased diversions through existing facilities would be allowed under appropriate authorizations. Limited dewatering of water sources may be allowed, if developments assisted in meeting livestock, wildlife, and/or recreation objectives. The greatest impact on water resources may occur where water development would be high enough in the watershed to result in dewatering of the resource. Dewatering at a site may impact local soil conditions and may impact surrounding vegetation (thereby limiting riparian species and favoring more upland species). The duration of the impact would depend on the duration of the dewatering.

Under this alternative, the BLM would work closely with the Colorado Water Conservation Board to establish instream flow rights for perennial streams in the Monument. On unprotected reaches, the BLM would only authorize new land uses that would ensure sufficient flows remained to support water-dependent values. Additionally, the BLM would seek to increase water flows by prioritizing noxious weed removal in and around seeps, springs, and streams within two years of signing of the ROD.

With site-specific analyses for water development projects (in which projects are designed to minimally impact water-dependent resources), and assuming the current trend of returning irrigation flows continues, the surface water and near-surface water features in the Monument may continue to have larger flows over natural conditions. These augmented water features may continue to provide water for uses, such as wildlife, livestock, and/or for recreation.

Alternative III may have a long-term beneficial impact on 5,312 acres of riparian systems. Under this alternative, the BLM would apply an NGD/NSO restriction to riparian zones, including springs and combinations of canyon bottoms, riparian areas, and floodplains associated with all stream types. These restrictions may help maintain and enhance riparian areas, which, in turn, may help filter sediment, encourage the infiltration of surface runoff, help stabilize stream banks, and/or provide shade to regulate stream temperature.

Water contamination at road and trail crossings typically results from sediment being dislodged from the road surface or the vehicle, and, to a lesser extent, from the leakage or spill of fluids and chemicals from vehicles and equipment. Under Alternative III, designated road crossings would be permitted in the NGD/NSO riparian areas only if an analysis demonstrates that the crossing would not contribute to a stream segment either not achieving, or not making progress toward achieving PFC. This management action may help to minimize the risk of water quality contamination at stream crossings.

Cultural Resources Management

Alternative III identifies the development of 13 to 25 cultural sites for public use, interpretive signage, infrastructure, and/or visitor services that may have negligible impact on water resources. Sediment produced by ground-disturbing activities (facility construction, and traffic) may be short-term, minor, and localized. The majority of known cultural sites are located on uplands, away from perennial streams, and visitation to these sites may have no measurable impact on streams or groundwater resources.

In order to help protect existing spring riparian areas that are associated with cultural sites, the BLM would obtain water rights for these areas. This may have a long-term beneficial impact on these special habitats in that such actions may help maintain flows sufficient for sustaining riparian-dependent species.

Fluid Minerals Management

Fluid minerals management may have long-term impacts on water resources. Under Alternative III, up to 3,021 acres would be available for new leases, which would equate to 73 acres of ground disturbance. Existing leases would continue to be developed and not be affected. The increase in acres of fluid mineral development may equate to an increase in risk of impacts to water resources from erosion of sediment into streams.

Rangeland Resources Management

Alternative III may have a long-term, beneficial impact on water resources in the Monument. The rangeland capacity would be reduced from current conditions to 8,368 active AUMs by closing five allotments. Adjusting the duration and extent of spring grazing and implementing rest-rotation grazing schedules may help to improve water and riparian resources throughout the Monument. The benefits of these management actions may include increased vegetative cover, less disturbance to the biological soil crust, and reduced soil compaction, resulting in less soil erosion and surface runoff. As a result, less sediment may be deposited into streams, resulting in additional benefits to water quality, such as increased dissolved oxygen and decreased nitrite concentrations.

Under Alternative III, new water developments would be allowed to support livestock, and a limited dewatering of streams or springs may occur. Therefore, the impact of livestock on water quantity may be the greatest at these sites, and less over the entire Monument due to the fact that most flows would be maintained through water resource management. Under the management actions of Alternative III, livestock would not be fully excluded from riparian areas. However, areas known to not be meeting PFC would be periodically rested.

The potential for sedimentation from upland livestock grazing may be reduced under Alternative III as a result of adjusting the duration and extent of spring grazing, and implementing rest-rotation grazing schedules. Management actions under Alternative III, however, may impact stream channel shape; in that such actions may continue the processes that are altering stream channels in the Monument. By continuing livestock impacts on upland vegetation and the soil biological crust, and providing access to riparian areas, Alternative III may retard the recovery of some water resources toward achieving PFC.

Recreation and Transportation Management

This alternative designates RMZs and SRMAs, and has a strategy of promoting destination recreation opportunities, with appropriate facilities and infrastructure, primarily for regional visitors. The actual level of impact would depend on the maintenance and construction of these facilities, the proximity of facilities to water bodies, the types of recreation use, and/or to the number of visitors. The expansion of the Lower Sand Canyon road parking area may increase surface runoff and contamination into McElmo Creek. However, the installation of proper mitigation measures may greatly minimize this impact. Water usage for a limited number of facilities may have a minor impact on water quantity. The impacts of facilities on water resources may diminish with distance from the water body.

Differing types of recreation would have varying levels of impacts on water resources. Dispersed foot traffic may have a minimal impact on water resources, unless visitors waded directly into stream channels. The amount of expected foot traffic at any given time in the Monument may be too low to produce measurable impacts on stream channels. OHV use may have a large impact on water resources, especially if designated OHV roads cross stream valleys. OHVs may displace large amounts of soil and create soil ruts, which, in turn, may funnel runoff and sediment into nearby streams. Under Alternative III, nine miles of roads would be designated for OHVs, but 60 miles of roads would be open to all forms of travel. If these roads are well maintained, and sited away from water bodies, and OHV drivers remain on these roads, then adverse impacts to water resources may be mitigated.

Traffic along the 189 miles of roads (both motorized, non-motorized, and/or mechanized) may result in localized, long-term soil compaction and displacement (1,096 acres). The closing of roads may have a long-term beneficial impact on water resources, in that such actions may reduce the volume of traffic and return the land to a more natural surface. Although residual road compaction may persist for decades, former roads that are reclaimed by vegetation may regain some of their infiltration and runoff dispersal functions following a single growing season. Decompressing and/or recontouring roads may greatly accelerate their recovery. Given current levels of visitation, and with public traffic constrained to fewer areas, the proposed transportation scenario may have beneficial impacts on water resources, when compared with current management.

Alternative IV

Water Resources Management

Under this alternative, new surface water and/or groundwater developments would be encouraged to meet livestock and wildlife management objectives, or redeveloped to reduce

impacts to cultural resources. After completion of a thorough impact analysis, groundwater development would be encouraged for the purposes of meeting water supply needs for energy and mineral development projects. Existing facilities would continue to operate under their historic authorizations, and increased diversions through existing facilities would be allowed under appropriate authorizations. The BLM would also allow for the conversion of water facilities from traditional uses (such as irrigation and livestock) to industrial and commercial uses.

Although the BLM would work closely with the Colorado Water Conservation Board to establish instream flow rights for perennial streams in the Monument, any water not protected by instream flow rights would be available for appropriation for industrial, commercial, and/or traditional uses. In areas of intense resource development, priority for use of limited water supplies would be given to resource-development purposes over water-dependent natural resource values. The dewatering of water sources could be allowed if such developments assisted in meeting other management objectives. The greatest impact on water resources may occur where water development would be high enough to result in dewatering of the resource. Dewatering at a site may impact local soil conditions and impact surrounding vegetation (thereby limiting riparian species and favoring more upland species). The duration of the impact would depend on the duration of the dewatering. Although the BLM would seek to increase flows by treating high-priority seeps, springs, and streams for noxious weeds, as time and funding permit, intense demands on these resources may likely result in decreased base flows. With increased demands on existing water resources, current return flows from upland irrigation may not be enough to sustain flows at some sites.

Alternative IV may have a long-term beneficial impact on 3,217 acres of riparian systems. Under this alternative, the BLM would emphasize management activities that would benefit some riparian areas and floodplains by applying an NGD/NSO restriction. The restriction would apply to riparian zones, including springs and combinations of riparian areas and floodplains associated with all stream types. These restrictions may help maintain and enhance riparian areas, which, in turn, may help filter sediment, encourage the infiltration of surface runoff, help stabilize stream banks, and provide shade to regulate stream temperature, among other functions.

Water contamination at road and trail crossings typically results from sediment being dislodged from the road surface or the vehicle, and, to a lesser extent, from the leakage or spill of fluids and chemicals from vehicles and equipment. Under Alternative IV, designated road crossings would be permitted in the NGD/NSO riparian areas only if an analysis demonstrated that the crossing would not contribute to a stream segment either not achieving, or not making progress toward achieving PFC. This management action may help to minimize the risk of water quality contamination at stream crossings.

Cultural Resources Management

Alternative IV identifies the development of 13 to 25 cultural sites for public use, with stabilization, interpretive signage, infrastructure, and/or visitor services, which may have negligible impact on water resources. Sediment produced by ground-disturbing activities (facility construction and traffic) may be short-term, minor, and localized. The majority of known cultural sites are located on uplands, away from perennial streams, and visitation to these sites may have minimal to no measurable impact on streams and/or groundwater resources.

In order to help protect existing spring riparian areas that are associated with cultural sites, the BLM would obtain water rights for these areas. This may have a long-term beneficial impact on these special habitats in that such actions may help maintain flows sufficient for sustaining riparian-dependent species.

Fluid Minerals Management

The management of fluid minerals may have long-term impacts on water resources. Under Alternative IV, 24,462 acres would be available for new leases, which would equate to 447 acres of ground disturbance tied to new leases. Existing leases would continue and would not be affected. Due to the greater potential for mineral development under Alternative IV, the potential adverse impact on water resources may be greater than under current conditions.

Rangeland Resources Management

Alternative IV may have long-term impacts on water quantity and water quality in the Monument. Extensive livestock watering may reduce base flows at watering sources. Under Alternative IV, new water developments would be prioritized to support livestock over preserving base flows. Therefore, the impact of livestock on water quantity may possibly be major at heavily developed and utilized sites.

Although the Monument would continue to be managed with the current capacity of 8,492 active AUMs, adjusting the duration and extent of spring livestock grazing and implementing rest-rotation grazing schedules may improve water resources. Adjusting the duration and extent of spring grazing and implementing rest-rotation grazing schedules may increase vegetative cover and reduce soil compaction, resulting in less soil erosion and surface runoff. Excluding livestock from some riparian areas may also benefit riparian function. The potential for sedimentation from upland livestock grazing may be slightly reduced under Alternative IV as a result of livestock management. The overall impact of these limited improvements may be minor on water quality and may result in a slow response.

Recreation and Transportation Management

This alternative designates RMZs and SRMAs, and has a strategy of promoting destination recreation opportunities, with more facilities and infrastructure, primarily for national and international visitors. Areas of water would likely be targeted for recreation facilities and infrastructure. The actual level of impact would depend on the maintenance and construction of visitor facilities, the proximity of these facilities to water bodies, the types of recreation use, and the number of visitors. Temporary, localized impacts to water quality may occur during visitor facility construction due to soil disturbance and increased equipment traffic. Long-term impacts may result from the installation and/or expansion of permanent features, such as parking lots, which may increase surface runoff into adjacent streams. The impacts of facilities on return flows may diminish with distance from the water body. The expansion of the Lower Sand Canyon road parking area may increase surface runoff and contamination into McElmo Creek. If proper mitigation measures are put into place, this impact may be minimized.

Facilities that require water withdrawals (e.g., restrooms, kitchens, laundry) may have a greater impact than more primitive sites without developed water sources. Water development would be prioritized for recreational use over water resource values; therefore, some facilities could potentially reduce base flows enough to dewater sites. Water bodies that experience substantially diminished flows may no longer be able to support some water-dependent species.

Under Alternative IV, 19 miles of roads would be designated for OHV use and 102 miles of roads would be available for all means of transportation. If these roads are well maintained and sited away from water bodies, and OHV drivers remain on these roads, then adverse impacts to water resources may be minimized.

Traffic along the 213 miles of roads (both motorized, non-motorized, and/or mechanized) may result in localized, long-term soil compaction and displacement (1,235 acres). Under Alternative IV, no existing user-created roads would be closed or reclaimed, increasing the potential impact

from sedimentation over the other alternatives. However, the total number of road miles available to the public for all travel means would still be less than that under the current transportation system (Alternative I). Therefore, the risk of potential adverse impacts from road use on water resources may be less than that under current conditions, but greater than that expected under all of the other alternatives.

Alternative V (Preferred Alternative)

Water Resources Management

Alternative V may have a long-term beneficial impact on water quantity and quality in the Monument. Under Alternative V, the BLM would acquire water rights on point sources, such as reservoirs, wells, and springs, to support all water uses in the Monument. Existing water rights would be honored and new surface water and groundwater developments would only be issued to mitigate environmental impacts, restore native habitats or populations, support visitor facilities, and/or to mitigate impacts to cultural resources. New developments would only be implemented following a NEPA analysis of potential impacts, and only when the development would not dewater springs or streams. Groundwater development would be discouraged, and would only be implemented following a full impact analysis of the proposal on water resources.

Under Alternative V, the BLM would work with the owners of existing water infrastructure to reduce the facilities' impacts on riparian habitat. Additionally, new diversions through existing facilities would only be allowed where NEPA analysis demonstrates an overall benefit to Monument resources. The BLM would also work closely with the Colorado Water Conservation Board to establish instream flow rights for suitable perennial and seasonal streams in the Monument. On unprotected reaches, the BLM would only authorize new land uses that would ensure sufficient flows remained to support water-dependent values. Additionally, the BLM would potentially increase water flows by developing a list of high priority water sources for noxious weed control and by beginning treatment on these sites within three years of the signing of the ROD.

With these management actions in place, and assuming the current trend of returning irrigation flows continues, the surface water and near-surface water features in the Monument may continue to have larger flows over natural conditions. These augmented water features may continue to sustain riparian habitats and may provide water for other uses, such as wildlife, livestock, and/or for recreation.

Alternative V may also have a greater long-term beneficial impact on riparian systems. Under this alternative, the BLM would protect 5,312 acres of riparian systems by applying an NGD/NSO restriction. This restriction may help maintain and enhance riparian areas, which, in turn, may help filter sediment, encourage the infiltration of surface runoff, help stabilize stream banks, and provide shade to regulate stream temperature, among other functions. This alternative would strive to protect not only riparian areas and floodplains, but canyon bottoms as well. Additional information regarding impacts to riparian areas is provided in Subsection 3.1.8, Vegetation Resources.

Water contamination at road and trail crossings typically results from sediment being dislodged from the road surface or the vehicle, and, to a lesser extent, from the leakage or spill of fluids and chemicals from vehicles and equipment. Under Alternative V, designated road crossings would be permitted in the NGD/NSO riparian areas only if an analysis demonstrated that the crossing would not contribute to a stream segment either not achieving, or not making progress toward achieving PFC. This management action may help minimize the risk of water quality contamination at stream crossings.

Cultural Resources Management

Alternative V identifies the development of 13 to 25 cultural sites for public use, with minimal stabilization, interpretive signage, infrastructure, and/or visitor services, and may have negligible impact on water resources. Sediment produced by ground-disturbing activities (facility construction and traffic) may be short-term, minor, and localized. The majority of known cultural sites are located on uplands, away from perennial streams, and visitation to these sites may have little measurable impact on streams and/or groundwater resources.

In order to help protect existing spring riparian areas that are associated with cultural sites, the BLM would obtain water rights for these areas. This may have long-term beneficial impacts on these special habitats in that such actions may help maintain flows sufficient for sustaining riparian-dependent species.

Fluid Minerals Management

The management of fluid minerals may have long-term impacts on water resources. Under Alternative V, up to 880 acres would be available for new leases, equating to up to 18 acres of potential ground disturbance. Existing leases would continue and would not be affected. This level of development may likely have few adverse impacts, if managed properly.

Rangeland Resources Management

Alternative V may have a long-term, beneficial impact on water resources in the Monument. Emphasizing a reduction of authorized livestock use to 6,437 active AUMs, adjusting the duration and extent of spring grazing, and implementing rest-rotation grazing schedules may help improve water and riparian resources throughout the Monument. The benefits of these management actions may include increased vegetative cover and reduced soil compaction, resulting in less soil erosion and surface runoff. As a result, less sediment may be deposited into streams, resulting in additional benefits to water quality, such as increased dissolved oxygen and decreased nitrite concentrations. If livestock are restricted from direct access to surface water, direct water contamination and the loss of riparian vegetation (and resulting channel changes) may be minimal to none.

Under the management actions of Alternative V, direct sedimentation may be minor in that riparian areas would be excluded from livestock use where Public Land Health Standards are not being met. Given that livestock may have limited access to surface water under Alternative V, the impact of direct contamination may be possible at the site scale. The potential for sedimentation from upland livestock grazing may be reduced under Alternative V by reducing the number of authorized uses, adjusting the duration and extent of spring grazing, and implementing rest-rotation grazing schedules. Consequently, the indirect impacts of sedimentation on water resources may be minor over the long-term.

Implementing the management actions under Alternative V may also have a beneficial impact on stream channel shape in that such actions may eliminate or reduce the processes that are altering stream channels in the Monument. By protecting upland vegetation (thereby decreasing surface runoff and sedimentation), excluding livestock from stream banks, and protecting essential riparian vegetation, Alternative V may help to reverse adverse processes and allow for the recovery of channels toward achieving PFC.

Recreation and Transportation Management

This alternative designates RMZs and SRMAs, and contains a mix of promotion strategies. Up to 157,460 acres within the Monument would be managed for the primitive, undeveloped recreation experience, with minimum facilities and infrastructure. These areas would be primarily used by local visitors. Approximately 7,875 acres would be managed under a

destination strategy, with appropriate support facilities, to meet the needs of regional visitors. The amount of recreational development would vary among sites, with some having only minimal structures (signs), and others having more substantial structures (parking lots). The actual level of impact would depend on the maintenance and construction of visitor facilities, the proximity of these facilities to water bodies, the types of recreation use, and/or the number of visitors. Temporary, localized impacts to water quality may occur during visitor facility construction due to soil disturbance and increased equipment traffic. Long-term impacts may result from the installation of permanent features, such as parking lots, which may, in turn, increase surface runoff into adjacent streams. Water usage for a limited number of facilities may have a minor impact on water quantity. The impacts of facilities on water resources may diminish with distance from the water source.

Differing types of recreation would have varying levels of impacts on water resources. Dispersed foot traffic may have a negligible impact on water resources, unless visitors waded directly into stream channels. The amount of expected foot traffic at any given time in the Monument may be too low to produce measurable impacts to channels. Eight miles of roads would be designated for OHV traffic, while 74 miles would be open to all forms of traffic. If these roads are well maintained and sited away from water bodies, and OHV drivers remain on these roads, then adverse impacts to water resources may be minimized. Cross-country OHV use is prohibited in the Monument; consequently, there would be no impact from dispersed OHV travel.

Traffic along the 169 miles of roads (both motorized, non-motorized, and/or mechanized) may result in localized, long-term soil compaction and displacement (980 acres). Under Alternative V, most existing user-created roads would be closed and reclaimed, and fewer roads would be open to public use. A lower density of roads in the Monument, with the expected volume of visitor traffic, may likely have minor impacts on water resources. Because no new road construction and no rerouting are proposed under Alternative V, the impacts of road construction on water resources may be negligible.

The closing of roads may have a long-term beneficial impact on water resources, in that such actions may reduce the volume of traffic and return the land to a more natural surface. Although residual road compaction may persist for decades, former roads that are reclaimed by vegetation may regain some of their infiltration and runoff dispersal functions following a single growing season. Decompacting and/or recontouring roads may greatly accelerate their recovery.

4.2.10.3. Water Resources Management Impact Comparison

The water resources impact comparison is presented in Table 4-18. This table compares the consequences of resource management actions under each alternative on water resources.

4.2.10.4. Cumulative Impacts

Cumulative impacts to Monument water resources and watersheds may include flow augmentation and water contamination (including sedimentation). The cumulative impacts of extracting water for cultural and visitor facilities, fluid minerals operations, and livestock watering may likely be compensated by offsite irrigation returns; therefore, they may be negligible. Irrigation upstream in the watersheds may continue to return a greater volume of water to Monument streams than under natural conditions. Due to these irrigation returns, otherwise intermittent and ephemeral streams now flow year-round. This change in flow regime may allow for the establishment and maintenance of riparian zones along these reaches. Protecting existing spring riparian areas that are associated with cultural sites by obtaining water rights for

these areas may provide a long-term benefit to the local resource, and to other resources dependent on that water, such as downstreams, offsite streams, and/or migrating wildlife.

The continued management of fluid minerals associated with existing leases in the Monument, as well as those occurring offsite, may cumulatively impact water resources. Potential impacts to surface waters from fluid minerals extraction may include soil disturbance resulting in sediments washing and/or blowing into nearby streams; contaminated runoff from project wells entering streams and/or groundwater; and contaminants spilling, leaking, and/or being washed off of vehicles and equipment into streams at road crossings. In addition, the depletion of surface water may result from drilling and cross-connection of water-bearing zones that may be tributary to surface water.

Potential impacts to groundwater from the management of fluid minerals may include cross-contamination of aquifers across geologic strata due to improper sealing of aquifers encountered by the well bore; possible contamination of shallow-water aquifers due to surface spills, accidental releases, and/or by the leakage of fluids during the transfer and/or transportation of produced water; and contaminated surfaces coming into contact with groundwater resulting from improperly sealed surface casing, well bore stimulation activities, mineral production, and/or abandonment activities. These impacts may occur on or off the Monument, and may have widespread impacts. However, actual impacts may depend on the proximity of roads, pads, and/or support facilities to water sources; the magnitude, duration, and intensity of precipitation events (which can influence the volume of contaminated runoff reaching streams); well completion techniques; and the BMPs used for stormwater pollution control. Wells sited away from actively flowing surface waters may have a lower risk of impacting water resources.

With appropriate mitigation measures in place, the risk of contaminating surface water and/or groundwater during the management of fluid minerals may be low. When proper procedures are followed, accidental spills are rare and are usually contained. Implementing BMPs, such as inspecting vehicles frequently for leaks and lining reserve pits, may greatly reduce the risk of potential contaminants reaching water resources.

Contaminants in upstream offsite irrigation flows, and to a lesser extent, livestock in or near surface waters, may continue to impact water quality in Monument watersheds. Cumulative sources of excess sediment in streams may include erosion of channels and stream banks (due to peak flow events scouring the stream); livestock removing vegetation and collapsing stream banks and roads (particularly at stream crossings); and soil-disturbing construction, recreation, and/or cultural activities. These impacts may occur both above and on Monument lands and may cumulatively impact water resources on and below the Monument.

Several management actions under Alternatives II and V may likely reduce the amount of sediment currently reaching stream channels on and below the Monument. These activities include removing livestock from stream channels, maintaining riparian vegetation, reducing surface runoff from upland livestock grazing, closing roads, restricting road crossings, and/or minimizing cultural and recreational facilities. Several management actions under Alternative III may also reduce the impact of sediment on and below the Monument by reducing surface runoff from upland livestock grazing, closing roads, restricting road crossings, and minimizing cultural and recreational facilities. Livestock access to stream channels and riparian areas may continue to impair these resources and may result in sedimentation into streams. With an emphasis on further development under Alternative IV, excess sedimentation may likely continue to impact streams on and below the Monument.

Regionally, and nationally, recreation is on the increase. As more and more people find themselves living in urban environments, the demand to recreate on public lands may become

more intense. Limiting the number of developed recreation sites within the Monument could concentrate visitors at these facilities or in areas outside of the Monument that are not as intensively managed. Depending on the type, intensity, and duration of this use, there may be adverse impacts to water resources within and adjacent to the Monument.

Table 4-18 Comparison of Impacts to Water Resources

Types of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Water Resources	Protect 2,415 acres of riparian system. Apply no restrictions on groundwater and new water developments.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Discourage groundwater and new water developments.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Allow groundwater and new water developments.	Protect 3,217 acres of riparian areas and floodplains. Encourage groundwater and new water developments to support expanded resource development.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Discourage groundwater and new water developments.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Fluid Minerals	No Impact.	Allow up to 18 acres of disturbance under new leases.	Allow up to 73 acres of disturbance under new leases.	Allow up to 447 acres of disturbance under new leases.	Allow up to 18 acres of disturbance under new leases.
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs.
Recreation and Transportation	Allow 149 miles of roads (with 864 acres of disturbance). Promote no specific recreation strategy (with facility development as needed).	Allow 139 miles of roads (with 806 acres of disturbance). Promote undeveloped strategy with minimum facilities.	Allow 189 miles of roads (with 1,096 acres of disturbance). Promote destination strategy with appropriate support facilities.	Allow 213 miles of roads (with 1,235 acres of disturbance). Promote destination strategy with more facilities.	Allow 169 miles of roads (with 980 acres of disturbance). Promote undeveloped strategy, minimal facilities and destination strategy with support facilities.

4.2.11. Education and Interpretation

The primary goal for education and interpretation in the Monument is to increase appreciation of the objects identified in the Proclamation by creating opportunities for visitors and other users to learn about the Monument landscape and about its multiple-uses, as well as about the needs for protection and stewardship. Another goal is to ensure long-term benefits from research, education, and cultural heritage while, at the same time, balancing other uses and considering the impacts on the local economy. The management objectives related to these goals include:

- develop and implement a comprehensive Interpretation and Education Plan for the Monument;
- make available significant resources and areas for interpretation and education activities, including those identified within the Proclamation (e.g., the entire cultural landscape, the geology of McElmo Dome, the various species of wildlife, and the unique herpetological resources).

Public education and interpretation, as well as heritage tourism, are critical for long-term protection of Monument resources. Current strategies include encouraging all visitors to first visit the AHC, which is where the Monument is headquartered; promoting the “leave no trace” concept; supporting education efforts with partners; incorporating strong preservation and advocacy messages in all exhibits, programs, and curriculum; and working with heritage tourism organizations in the Four Corners area to emphasize preservation messages during every visitor contact. It is also considered critical to incorporate information from current research into visitor programs, so that the values of cultural and natural resources is understood.

Currently, visitors are directed to Lowry, Painted Hand, and Sand Canyon Pueblos, and to the Sand Canyon Trail. Maps, brochures, and on-site information are available for these locations. AHC staff endeavor to match each visitor with the type and quality of experience they are seeking, with an emphasis on visitor safety. Although the entire Monument is open to the public, no other sites in the Monument are currently prepared for visitation. The Monument is managed as an outdoor-museum, where visitors are encouraged to experience the area through self-discovery. There are no services, restaurants, gas stations, ranger guided tours, or developed campgrounds. Continued research, education, interpretation, and heritage tourism may raise the awareness of the values of the Monument’s resources, as well as the sensitivities necessary to protect and preserve the resources. Developing these programs, in conjunction with specific site improvements, may increase visitors’ sense of value and respect, enhance their experiences and, may increase site preservation and public support. Interpretation and education programs are also used as part of an undeveloped backcountry visitor program.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to education and interpretation.

Beneficial impacts to the education and interpretation program include opportunities that enhance interpretive opportunities and access to facilities. Direct adverse impacts include insufficient interpretive opportunities, facilities, and/or materials to meet public demand. Indirect beneficial impacts may include, increased law enforcement efforts that would help deter vandalism of Monument resources.

4.2.11.1. Evaluation Criteria and Assumptions

Impacts to education and interpretation resources can be both quantitative and qualitative. Opportunities for information and education can be measured in terms of the number of sites

interpreted and/or in terms of opportunities to increase awareness of resource values and sensitivities.

Assumptions used in analyzing impacts to education and interpretation resources include the following:

- Federal lands within the boundary of the Monument, including the AHC, were used as the impacts analysis area for both individual and cumulative impacts.

4.2.11.2. Alternative Analysis

Impacts to education and interpretation resources may differ in severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for education and interpretation, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Education and Interpretation Management

Education and interpretation management under Alternative I would include organizing public involvement programs; interpreting Monument resources and values; providing environmental education to visitors on important topics; managing cultural resources for protection, preservation, investigation, and public use; maintaining developed recreation sites at Lowry, Painted Hand, and Sand Canyon Pueblos for interpretation and information; developing interpretive signing; developing new sites and areas for controlled visitation; managing the AHC as a focal point for education and interpretation; providing information to visitors on safety and resource protection; and organizing public interpretive programs.

The direct impacts of education and interpretation management may be beneficial due to the increased use of interpretive materials and enhanced visitor participation and appreciation. The impact of education and interpretation management on preservation of Monument resources may be beneficial.

Cultural Resources Management

Cultural resources management under Alternative I would include developing new sites and areas with controlled visitation. The AHC would continue as the focal point for interpretation, and visitors would be directed to Lowry, Painted Hand, and Sand Canyon Pueblos, and to the Sand Canyon Trail. Various levels of interpretation and management of data and collected material may enhance public awareness of resources and may lead to developing and protecting suitable cultural resources for public enjoyment. Approximately 240 sites would be stabilized. Protecting Monument cultural resources and developing interpretation for the public may enhance visitor participation and education, thereby increasing awareness of and appreciation for, Monument objects, which may be a beneficial impact.

Fluid Minerals Management

There would be no fluid minerals management actions pertaining to education and interpretation.

Rangeland Resources Management

There would be no rangeland resources management actions pertaining to education and interpretation.

Recreation and Transportation Management

Management of recreation resources under Alternative I would include maintaining developed recreation sites at Lowry, Painted Hand, and Sand Canyon Pueblos; preventing or reducing resource degradation; establishing site-specific visual quality and design guidelines for interpretation and for visitor management; constructing interpretive roads; and developing visitor management plans. Sand Canyon/Rock Creek, Mockingbird-Rincon, Cross, and Squaw Canyons would continue to be managed as undeveloped areas, with a focus on incidental and local visitors. Recreation management may result in direct beneficial impacts to education and interpretation due to the preservation of resources and to the design and construction of interpretive materials.

Transportation management under Alternative I would include 149 miles of roads, of which 131 miles would be open to all forms of public travel. Seven support facilities would be maintained under this alternative. No new roads would be developed, pending completion of a transportation management plan.

Alternative II

Education and Interpretation Management

Education and interpretation management under Alternative II would include developing an Interpretation and Education Plan for the Monument, minimizing on-the-ground interpretive media, focusing interpretive media at staging areas, and limiting interpretive media to developed sites.

Under Alternative II, education and interpretation activities would be directed from the AHC. Although this alternative may limit the amount of on-Monument interpretive information available, the overall impact may be beneficial. BLM guidance on developing interpretation and education plans (see Appendix F) provides a framework for increased collaborative education and interpretation opportunities that would advance knowledge and preservation of Monument resources. Enhancements called for under this alternative include developing a plan that reflects Pueblo, Navajo, Ute, Spanish/Hispanic, and Anglo history in the Monument; developing differing approaches to public education for high-use, intermediate-use and backcountry zones; and adding “semi-developed” sites in high-use zones, if visitor demand warrants.

Cultural Resources Management

Cultural resources management under Alternative II would include allocating 13 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, obtaining Native American interpretive consultation, and requiring training and education for SRPs for site visits. A broad-based standing research committee would guide research proposals, with new information then incorporated into interpretation, education, and heritage tourism. Public awareness of resources would be enhanced through interpretation by the AHC. Additionally, an increase in Native American interpretive information could be disseminated, which may increase the public’s understanding and sense of value for the resources.

Fluid Minerals Management

There would be no fluid minerals management actions pertaining to education and interpretation.

Rangeland Resources Management

There would be no rangeland resources management actions pertaining to education and interpretation.

Recreation and Transportation Management

Management of recreation resources under Alternative II would include promoting an undeveloped management strategy, and minimizing infrastructure and visitor facilities. The entrance fee to the AHC would continue, and fees would be established for Pueblo sites, as well as for Lowry, Sand Canyon, and Painted Hand.

Although Monument resources would be preserved, direct access to them would be inhibited; therefore, recreation management may result in adverse impacts to onsite education and interpretation. Recreation management may result in beneficial impacts to offsite education and interpretation due to the lack of infrastructure and access to Monument resources, which may then shift education and interpretation emphasis to the AHC. However, this shift may be counteracted by the entrance fee.

Transportation management roads under Alternative II are shown on Map 5. Out of the total 139 miles of roads, 50 would be open to all forms of public travel. Seven support facilities would be maintained under this alternative. Transportation management may result in adverse impacts to education and interpretation due to the fact that Monument resources may not be easily accessed.

Alternative III***Education and Interpretation Management***

Education and interpretation management under Alternative III would include developing an Interpretation and Education Plan for the Monument, minimizing on-the-ground interpretive media, focusing interpretive media at staging areas, and limiting interpretive media to developed sites.

Under Alternative III, education and interpretation activities would be directed from the AHC. This alternative would increase the amount of on-Monument interpretive information through kiosks, self-guided tours, and other tools. BLM guidance on developing interpretation and education plans (see Appendix F) would provide a framework for increased collaborative education and interpretation opportunities that would advance knowledge and preservation of the Monument resources. Enhancements called for under this alternative include developing a plan that reflects Pueblo, Navajo, Ute, Spanish/Hispanic, and Anglo history in the Monument area; developing differing approaches to public education for frontcountry, middlecountry, and backcountry zones; and adding additional “semi-developed” sites in high-use zones, if visitor demand warrants.

Cultural Resources Management

Cultural resources management under Alternative III would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and requiring training and education for SRPs for site visits. Under this alternative, Monument staff would seek input from outside knowledgeable researchers, and would rely on an ad-hoc peer review committee to guide research proposals, with new information then incorporated into interpretation, education, and heritage tourism projects. Public awareness of resources may be enhanced through interpretation by the AHC. These actions may result in beneficial impacts to education and interpretation uses due to the fact that visitors would be directed to these sites only after interpretation is developed and is available.

Fluid Minerals Management

There would be no fluid minerals management actions pertaining to education and interpretation.

Rangeland Resources Management

There would be no rangeland resources management actions pertaining to education and interpretation.

Recreation and Transportation Management

Management of recreation resources under Alternative III would include promoting a destination management strategy for regional and local visitors, providing specific public access points for Monument resources, providing appropriate visitor support facilities, designating additional roads, and establishing new parking areas (up to 10 cars) at the Pueblo Sites and Sand Canyon, and Rock Creek SRMAs. The entrance fee to the AHC would continue. This alternative may be beneficial because it would result in additional information and education, and increase access to Monument resources.

Transportation roads under Alternative III are shown on Map 5. This alternative calls for 189 miles of roads, of which 60 miles would be open to all forms of public travel. In addition, 13 support facilities would be maintained. Transportation management may result in a long-term beneficial impact to education and interpretation due to the fact that resources would be preserved because Monument resources would not be easily accessed.

Alternative IV

Education and Interpretation Management

Education and interpretation management under Alternative IV would include developing an interpretation and education plan for the Monument, minimizing on-the-ground interpretive media and focusing interpretive media at staging areas, and limiting interpretive media to developed sites.

Under Alternative IV, education and interpretation activities would be directed from the AHC. This alternative would call for an increase in the amount of on-Monument interpretive information, which may be marketed at the national and international level. BLM guidance on developing Interpretation and Education Plans (see Appendix F) would provide a framework for increased collaborative education and interpretation opportunities that may advance knowledge and preservation of Monument resources. Enhancements called for under this alternative include developing a plan that reflects Pueblo, Navajo, Ute, Spanish/Hispanic, and Anglo history in the Monument area; developing differing approaches to public education for frontcountry, middlecountry, and backcountry zones; and adding additional “semi-developed” sites in high-use zones, if visitor demand warrants.

Cultural Resources Management

Cultural resources management under Alternative IV would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites; and encouraging training and education for SRPs for site visits. Under this alternative, Monument staff would develop research goals internally, but would consider outside input. Investigator-initiated proposals would be evaluated by outside researchers, without a formal committee. New information would then be incorporated into interpretation, education, and heritage tourism projects.

Fluid Minerals Management

There would be no fluid minerals management actions pertaining to education and interpretation.

Rangeland Resources Management

There would be no rangeland resources management actions pertaining to education and interpretation.

Recreation and Transportation Management

Recreation resources management under Alternative IV would include promoting a destination management strategy for national, international, regional, and local visitors; providing specific public access points for Monument resources; providing additional infrastructure and visitor facilities; designating additional roads; and establishing new parking areas (up to 20 cars) at the Pueblo Sites, Sand Canyon, and Rock Creek SRMAs.

This alternative may create the greatest need for interpretive materials due to the fact promotion of the Monument would occur at a global level. Transportation management roads under Alternative IV are shown on Map 5. Approximately 213 miles of public roads would exist as part of this alternative, with 102 miles open to all forms of public travel. In addition, 20 support facilities would be maintained. Enhanced recreational opportunities and increased access to Monument facilities may be a beneficial impact to education and interpretation.

Alternative V (Preferred Alternative)**Education and Interpretation Management**

Education and interpretation management under Alternative V would include developing an Interpretation and Education Plan for the Monument, minimizing on-the-ground interpretive media, focusing interpretive media at staging areas, and limiting interpretive media to developed sites.

Under Alternative V, education and interpretation activities would be directed from the AHC. In addition, interpretive information would be made available at specific sites in the Monument. BLM guidance on developing interpretation and education plans would provide a framework for increased collaborative education and interpretation opportunities that would advance knowledge and preservation of the Monument resources. Enhancements called for under this alternative include developing a plan that reflects Pueblo, Navajo, Ute, Spanish/Hispanic, and Anglo history in the Monument area; developing differing approaches to public education for frontcountry, middlecountry, and backcountry zones; and adding additional “semi-developed” sites in high-use zones, if visitor demand warrants.

Cultural Resources Management

Cultural resources management under Alternative V would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, obtaining Native American interpretive consultation, and requiring training and education for SRPs for site visits. A broad-based standing research committee would guide research proposals, from which new information could be incorporated into interpretation, education, and heritage tourism. Additionally, an increase in Native American interpretive information could be disseminated, which may increase the public’s understanding of, and appreciation for, the resources. These management actions may be beneficial to education and interpretation.

Fluid Minerals Management

There would be no-fluid minerals management actions pertaining to education and interpretation.

Rangeland Resources Management

There would be no rangeland resources management actions pertaining to education and interpretation.

Recreation and Transportation Management

Management of recreation resources under Alternative V would include a mix of promotion strategies; therefore, a variety of information and education materials would be required. Infrastructure development would target developed sites, while the majority of the Monument would provide an undeveloped backcountry experience. The entrance fee to the AHC would continue.

Transportation management roads under Alternative V are shown on Map 5. This alternative would include 169 miles of roads, of which 74 miles would be open to all forms of public travel. In addition, as part of this alternative, 11 support facilities would be maintained.

These management actions may be beneficial to education and interpretation because educational opportunities may be enhanced and access to Monument facilities would improve.

4.2.11.3. Education and Interpretation Management Impact Comparison

The education and interpretation impact comparison is presented in Table 4-19. This table compares the consequences of resource management actions under each alternative on education and interpretation.

4.2.11.4. Cumulative Impacts

The primary outside influence on how education and interpretation is managed in the Monument is how it is marketed by other entities. It is important to work with local chambers of commerce and travel councils to make sure that there is a common vision for the Monument. Population growth in the Four Corners area may also impact information and education efforts due to a general increase in visitors, as well as to an increase in local school enrollment that, in turn, may increase the number of schools using the interpretive facilities at the AHC and in the Monument.

Table 4-19 Comparison of Impacts to Education and Interpretation					
Types of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Education and Interpretation	Maintain current development and distribution of interpretive material.	Develop Education and Interpretation Plan. Limit interpretive site development. Manage group visitation to backcountry sites.	Develop Education and Interpretation Plan. Limit interpretive site development. Manage group visitation to backcountry sites.	Develop Education and Interpretation Plan. Limit interpretive site development. Manage group visitation to backcountry sites.	Develop Education and Interpretation Plan. Limit interpretive site development. Manage group visitation to backcountry sites.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Fluid Minerals	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Rangeland Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Recreation and Transportation	Manage 149 miles of roads. Open 131 miles to all forms of public travel. Allow 7 support facilities. Promote no specific recreation strategy. Increase education and interpretation opportunities.	Manage 139 miles of roads. Open 50 miles to all forms of public travel. Allow 7 support facilities. Market to local residents.	Manage 189 miles of roads. Open 60 miles to all forms of public travel. Allow 13 support facilities. Market to regional visitors. Increase education and interpretation opportunities.	Manage 213 miles of roads. Open 102 miles to all forms of public travel. Allow 20 support facilities. Market to national and international visitors. Increase education and interpretation opportunities.	Manage 169 miles of roads. Open 74 miles to all forms of public travel. Allow 11 support facilities. Market to a mix of visitors. Increase education and interpretation opportunities.

4.2.12. Facilities and Infrastructure

The primary goals for facilities and infrastructure in the Monument include developing and maintaining the smallest number of facilities and infrastructure necessary to provide for public safety and to assist in meeting resource management objectives. Facilities and infrastructure include fences, troughs, roads, signs, visitor facilities, parking areas, boardwalks, railing, and other similar structures. The management objectives related to this goal include:

- coordinate the development and maintenance of facilities and infrastructure, when appropriate, with Federal, State, Native American tribal, and private landowners (i.e., Hovenweep National Monument, the Ute Mountain Ute Reservation, the Navajo Nation, the Utah BLM Monticello Field Office, and private landowners); and
- ensure that all major BLM facilities are located outside the Monument to protect Monument resources and to provide economic opportunities in the local communities.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to facilities and infrastructure.

Direct impacts to facilities and infrastructure may include, changes to facilities and infrastructure that impact the health and safety of visitors, staff, and Monument objects; and vandalism. The indirect impact of facilities and infrastructure may include increased or decreased protection of Monument objects.

4.2.12.1. Evaluation Criteria and Assumptions

Quantifying individual impacts to facilities and infrastructure is difficult due to fact that the location of potential impacts cannot be determined. Therefore, a descriptive analysis was conducted.

Assumptions used in analyzing impacts to facilities and infrastructure resource uses include the following:

- Facility and infrastructure BMPs would be implemented.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- The number of roads predicted for construction, based on new acres leased for mineral development, would all be new roads.

4.2.12.2. Alternative Analysis

Impacts to facilities and infrastructure may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for facilities and infrastructure, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Facilities and Infrastructure Management

Facilities and infrastructure management under Alternative I would include maintaining and rehabilitating existing camping facilities; considering applications for new facilities; implementing

non-structural alternatives, whenever possible; coordinating new facilities and existing facility improvements with the AHC; and constructing new livestock, watershed, and/or wildlife facilities only where NEPA analysis demonstrates no adverse impacts. Additionally, local communities would be allowed to provide facility-dependent settings and opportunities.

The direct impacts of these management actions may be beneficial. New signs, and parking at the Sand and East Rock Canyons and Painted Hand Pueblo may increase safety by removing non-designated parking along roads and by increasing awareness through the installation of new signs.

Cultural Resources Management

Cultural resources management under Alternative I would include developing new sites and areas, with controlled visitation and various levels of interpretation; managing data and collected material to enhance public awareness of resources through interpretation by the AHC; and developing and protecting suitable cultural resources for public enjoyment. This type of management would require signs, paths, and other infrastructure.

Fluid Minerals Management

Approximately 80 percent of the Monument lands are currently leased. Under Alternative I, the remaining 20 percent would not be leased and no new wells would be drilled; therefore, there would be no impacts from Alternative I fluid minerals management.

Rangeland Resources Management

Rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. In order to manage livestock distribution, fences, and water developments would be required, and would need to be maintained to remain operational and effective, based on specific management objectives in AMPs. These management actions may have a beneficial impact on facilities and infrastructure.

Recreation and Transportation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, as well as maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. The Monument travel system would include 149 miles (864 acres) of roads for motorized, mechanized, and/or non-motorized use. Cross-country motorized and mechanized travel would be prohibited. These forms of travel would only be allowed on designated roads within the 126,737 acres open to OHV use. There would be no promotion strategy under this alternative; therefore, facility and infrastructure needs would target incidental visitors and local residents. These management actions may result in beneficial impacts to facilities and infrastructure due to the fact that new sites and associated roads may increase visitor and staff safety at the Monument.

Other Resources Management

Under this alternative, a soil SSR/CSU would be applied for slopes greater than 40 percent (21,036 acres). The SSR/CSU would require an engineering/reclamation plan that demonstrates how site productivity would be restored, surface runoff would be controlled, and offsite areas would be protected from accelerated erosion. Additionally, surface-disturbing activities would not be allowed during extended wet periods. This restriction may be a beneficial impact to infrastructure and facilities because facilities would not likely be built on unstable or erosive slopes, and that timing constraints on construction would occur.

Alternative II

Facilities and Infrastructure Management

Facilities and infrastructure management under Alternative II would include maintaining and rehabilitating existing facilities; implementing non-structural alternatives, whenever possible; coordinating new facilities and existing facility improvements with the AHC; and constructing new livestock, watershed, and/or wildlife facilities only where NEPA analysis demonstrates no adverse impacts. Additionally, under Alternative II, the BLM would work with the National Park Service to determine the feasibility of a joint visitor center and develop visitor contact stations outside the Monument to mitigate resource impacts and ensure public safety. The BLM would also work with surrounding landowners to determine the need for fencing and signs and to develop a cost-sharing program to install and maintain fences and signs. Under this alternative, local communities would be allowed to provide facility-dependent settings and opportunities. The beneficial impacts of these actions may be minimizing facilities while, at the same time, providing for the health and safety of Monument visitors. Additionally, new offsite signs may increase public safety and there may be an increased awareness of private-land boundaries.

The direct impacts of this management may be beneficial. Signs may increase public safety because the flow of foot and car traffic in the Monument may be reduced and there may be an increased awareness of private-land boundaries.

Cultural Resources Management

Cultural resources management under Alternative II would include developing 13 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. These actions would require facilities and infrastructure to maintain visitor safety and education and the public would be directed to specific developed sites.

Fluid Minerals Management

Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. Under Alternative II, up to two new well pads would be anticipated, along with up to one mile of road and up to four miles of pipeline. Additional infrastructure would be required for new facilities associated with new leases, and may include utility lines, signs, and/or gates. This alternative would contain several restrictions, including NSO stipulations for slopes greater than 30 percent, and for the protection of cultural resources. These management actions may result in adverse impacts to facilities and infrastructure due to the additional facilities necessary to support fluid minerals development.

Rangeland Resources Management

Rangeland resources under Alternative II would be managed to improve Public Land Health Standards and to protect Monument objects. This management may not have any impact on facilities and infrastructure.

Recreation and Transportation Management

This alternative would promote an undeveloped recreation strategy, and would manage for local residents and incidental visitors. This management strategy would require minimum infrastructure. Under Alternative II, recreation management would include managing for custodial purposes, user conflicts, visitor safety, and/or for resource protection. Developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos would be maintained. Approximately 8,211 acres would be managed as visitation areas, and 157,124 acres would be managed as backcountry areas. By managing primarily for backcountry experiences, minimum signs and

facilities would be required. Under this alternative, no new SRPs would be issued, and existing SRPs would be allowed to expire.

Under this alternative, the Monument travel system would include 139 miles (806 acres) of roads for motorized, mechanized, and/or non-motorized use. Roads would be maintained, but upgrades would not be allowed. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Fluid minerals exploration and development on new leases would result in up to one mile of new roads.

Recreation and transportation management may result in beneficial impacts to facilities and infrastructure due to the fact that the Monument would be managed for a minimum number of facilities. Existing roads would be maintained for visitor health and safety.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may impact the infrastructure and facilities due to the fact that facilities would not likely be built on unstable or erosive slopes, and that construction timing constraints would occur. This may be a beneficial impact.

Alternative III

Facilities and Infrastructure Management

Facilities and infrastructure management under Alternative III would include maintaining and rehabilitating existing facilities; evaluating applications for new facilities; implementing non-structural alternatives, whenever possible; coordinating new facilities and existing facility improvements with the AHC; and constructing new livestock, watershed, and wildlife facilities only where NEPA analysis demonstrates no adverse impacts. Additionally, under Alternative III, the BLM would work with the National Park Service to determine the feasibility of a joint visitor center and to develop visitor contact stations outside the Monument in order to mitigate resource impacts and ensure public safety. The BLM would also work with surrounding landowners to determine the need for fencing and signs, and to develop a cost-sharing program for the installation and maintenance of fences and signs. Local communities would be allowed to provide facility-dependent settings and opportunities.

The beneficial impacts of these actions may be minimizing facilities while, at the same time, providing for the health and safety of Monument visitors.

Cultural Resources Management

Cultural resources management under Alternative III would include developing 13 to 25 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. These actions would require facilities and infrastructure for visitor safety and education. Visitors would be directed to specific developed sites.

Fluid Minerals Management

Under Alternative III, additional infrastructure would be required for new facilities associated with new fluid minerals leases, including utility lines, signs, and/or gates. Under this alternative, up to 3,021 acres would be available for leasing. Up to nine new well pads would be anticipated, along with up to three miles of roads, up to 18 miles of pipeline, and up to one new facility.

Rangeland Resources Management

Rangeland resources under Alternative III would be managed to improve Public Land Health Standards and to protect Monument objects. This management would not have any impact on facilities and infrastructure.

Recreation and Transportation Management

Recreation resources management under Alternative III would include promoting a destination management strategy for regional and local visitors; providing specific public access points for Monument resources; providing appropriate visitor support facilities; designating additional roads; and establishing new parking areas (up to 10 cars) at the Pueblo Sites, Sand Canyon, and Rock Creek SRMAs. An entrance fee to the AHC would be established.

Transportation management roads under Alternative III are shown on Map 5. The transportation system would include 169 miles of roads, including 69 miles of roads open to the public for all forms of travel. There would be roads specifically designated for bicycle, mountain bike, OHV, or dirt bike travel. Approximately 69 miles of roads open to all travel would exist. Roads would be maintained and surface upgrades could be authorized.

Recreation and transportation management under Alternative III would require the construction of additional facilities and infrastructure to manage increased visitation. Under this alternative, facilities would not be minimized; therefore, public safety may be increased.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may impact infrastructure and facilities due to the fact that facilities would not likely be built on unstable or erosive slopes and that construction timing constraints would occur. These may be beneficial impacts.

Alternative IV

Facilities and Infrastructure Management

Facilities and infrastructure management under Alternative IV would include maintaining and rehabilitating existing camping facilities; considering applications for new facilities; implementing non-structural alternatives, whenever possible; coordinating new facilities and existing facility improvements with the AHC; and constructing new livestock, watershed, and wildlife facilities only where NEPA analysis demonstrates no adverse impacts. Additionally, under Alternative IV, the BLM would work with the National Park Service to determine the feasibility of a joint visitor center and to develop visitor contact stations outside the Monument to mitigate resource impacts and ensure public safety. The BLM would also work with surrounding landowners to determine the need for fencing and signs, and to develop a cost-sharing program for installing and maintaining fences and signs. Local communities would provide facility-dependent settings and opportunities.

The direct impacts of this management may be beneficial. Signs may increase public safety due to the fact that the flow of foot and car traffic in the Monument may be reduced and that there may be an increased awareness of private-land boundaries. The indirect impact of this management may be beneficial due to the potentially increased economic gain for the local population.

Cultural Resources Management

Cultural resources management under Alternative IV would include developing 13 to 25 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. These actions would require facilities and infrastructure to maintain visitor safety and education due to the fact that visitors would be directed to specific developed sites.

Fluid Minerals Management

Under Alternative IV, up to 24,462 acres would be available for leasing. Fifty-nine new well pads would be anticipated, along with up to 19 miles of roads, up to 118 miles of pipeline, and two new facilities. This alternative contains several restrictions, including NSO stipulations for slopes greater than 30 percent, and for the protection of cultural resources.

Rangeland Resources Management

Rangeland resources under Alternative IV would be managed to improve Public Land Health Standards and to protect Monument objects. There may be no impacts from rangeland resources management.

Recreation and Transportation Management

Under Alternative IV, recreation management would include a destination management strategy, including establishing destinations for national and international visitors; and providing specific public access points, visitor facilities, access, and appropriate support facilities. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. New SRPs would be issued on a case-by-case basis.

Under this alternative, the Monument travel system would include 213 miles (1,235 acres) of roads for motorized, mechanized, and/or non-motorized use. There would be roads specifically designated for OHV, mountain bike, or dirt bike travel, in addition to roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Roads would be maintained, and surface upgrades could be authorized. This alternative would require additional infrastructure, including signs, parking areas, roads, and visitor centers due to the fact that global marketing for tourism would be emphasized.

Recreation and transportation management under Alternative IV may result in beneficial impacts to facilities and infrastructure. Under this alternative, Monument facilities would be increased and resources would be more easily accessed; therefore, access may be safer for visitors and Monument staff.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may impact infrastructure and facilities due to the fact that facilities would not likely be built on unstable or erosive slopes, and that timing constraints for construction could occur. This may be a beneficial impact.

Alternative V (Preferred Alternative)**Facilities and Infrastructure Management**

Facilities and infrastructure management under Alternative V would include maintaining and rehabilitating existing facilities; implementing non-structural alternatives, whenever possible; coordinating new facilities and existing facility improvements with the AHC; and constructing new livestock, watershed, and wildlife facilities only where NEPA analysis demonstrates no adverse impacts. Additionally, under Alternative V, the BLM would work with the National Park

Service to determine the feasibility of a joint visitor center and to develop visitor contact stations outside the Monument to mitigate resource impacts and ensure public safety. The BLM would also work with surrounding landowners to determine the need for fencing and signs, and to develop a cost-sharing program to install and maintain fences and signs. Local communities would provide facility-dependent settings and opportunities.

The direct impacts of this management may be beneficial. Signs may increase public safety and there would be an increased awareness of private-land boundaries. The indirect impact of this management may be beneficial due to the potentially increased economic gain for the local population.

Cultural Resources Management

Cultural resources management under Alternative V would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. These actions may result in direct impacts to facilities and infrastructure uses because visitors would be directed to specific sites, requiring signs, paths, and other infrastructure.

Fluid Minerals Management

Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. Under Alternative V, two new well pads would be anticipated, along with up to one mile of roads, and up to four miles of pipeline. New wells would be drilled within existing lease areas and would result in up to 121 new well pads, up to 67 miles of road, up to eight treatment facilities, and up to 53 miles of pipeline. The management of fluid minerals on facilities and infrastructure may include developing facilities in support of oil and gas development. Additional infrastructure, including roads and utilities, as well as offsite infrastructure, would be required for fluid minerals development. Soil resource NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be included in COAs for new leases.

Rangeland Resources Management

Rangeland resources under Alternative V would be managed to improve Public Land Health Standards and to protect Monument objects. There may be no impacts from rangeland resources management.

Recreation and Transportation Management

Under Alternative V, recreation management would include a combination of strategies. Undeveloped areas with minimal facilities would be combined with destination management strategies for Painted Hand and Sand Canyon Pueblos, the AHC, and Lowry Pueblo RMZs. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. Up to 10 new SRPs would be issued.

Under this alternative, the Monument travel system would include 169 miles (980 acres) of roads for motorized, mechanized, and/or non-motorized use. Roads would be maintained, but upgrades would not be allowed. There would be roads specifically designated for OHV, mountain bike, or dirt bike travel, in addition to roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. These forms of travel would only be allowed on designated roads within the 126,737 acres open to OHV use.

Recreation and transportation management may result in beneficial impacts to facilities and infrastructure because development would be minimized and increased access may improve public safety.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. These restrictions may be a beneficial impact on infrastructure and facilities due to the fact that facilities would not likely be built on unstable or erosive slopes, and that timing constraints for construction could occur.

4.2.12.3. Facilities and Infrastructure Management Impact Comparison

The facilities and infrastructure impact comparison is presented in Table 4-20. This table compares the consequences of resource management actions under each alternative on facilities and infrastructure.

4.2.12.4. Cumulative Impacts

New fluid mineral wells may be drilled within existing leased areas in the Monument and may result in up to 121 new well pads, 67 miles of road, eight treatment facilities, and 53 miles of pipeline over the next 20 years. Additional infrastructure, including roads and utilities, may be required for fluid minerals development, both on and off the Monument. The visitor center at Hovenweep National Monument may attract additional visitors to the area (as do other local attractions, such as Mesa Verde National Park). The entire “package” of parks and monuments in the Four Corners region draws people from all over the world who are interested in learning more about archaeology and culture. This attraction is bound to increase and, consequently, may require the construction of additional facilities to meet the increased needs.

As a result of increased demand for infrastructure, visual impacts to the natural landscape may occur. Construction of facilities with associated ground disturbance may result in loss of wildlife habitat and the possibility for erosion with additional sediments in stream systems. Noise levels from increased human presence (voices and vehicular) may reduce wildlife habitat security.

Table 4-20 Comparison of Impacts to Facilities and Infrastructure					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Facilities and Infrastructure	Increase safety by closing non-designated parking and installing new signs.	Increase safety by closing non-designated parking and installing new signs.	Increase safety by closing non-designated parking and installing new signs.	Increase safety by closing non-designated parking and installing new signs.	Increase safety by closing non-designated parking and installing new signs.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.	Develop 13 to 25 sites.
Fluid Minerals	No impact.	Make up to 880 acres available for leasing.	Make up to 3,021 acres available for leasing.	Make up to 24,462 acres available for leasing.	Make up to 880 acres available for leasing.
Rangeland Resources	Maintain facilities for 8,492 AUMs.	Maintain facilities for 6,437 AUMs.	Maintain facilities for 8,368 AUMs.	Maintain facilities for 8,492 AUMs.	Maintain facilities for 6,437 AUMs.
Recreation and Transportation	Promote no specific recreation strategy. Manage 149 miles of roads.	Promote undeveloped strategy with minimum facilities for local visitors. Manage 139 miles of roads.	Promote destination strategy with appropriate support facilities for regional visitors. Manage 189 miles of roads.	Promote destination strategy with more facilities for national and international visitors. Manage 213 miles of roads.	Promote a combination of strategies. Manage 169 miles of roads.
Other Resources: Soil Resources	Apply SSR/CSU to protect slopes greater than 40 percent (21,036 acres).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres).	Apply NGD/NSO stipulation for slopes steeper than 30 percent (36,504 acres).

4.2.13. Special Forest Products

The primary goals for management of special forest products are to allow for the harvest of forest products, the management of woodland stands, and the collection of other resources while, at the same time, protecting the objects (i.e., cultural, biological, and geological resources) identified in the Proclamation. Special forest products traditionally harvested in the Monument include fuelwood, fence posts, poles, and Christmas trees. More traditional forest products include bark materials, limb wood, foliar materials, seeds, and nuts. The management objectives related to this goal include harvesting forestry products and all woodland stands to help sustain a biologically diverse landscape that supports a variety of habitats and native plant and animal species.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to special forest products.

A number of proposed management actions have the potential to impact special forest products, as a component of native vegetation. For this discussion, beneficial impacts to forest product resources may include, an increase in areas of woodlands; an improvement in woodland health (in terms of increased diversity of stand species and/or size class); and a decrease in the size of noxious weed populations and insect and/or pathogen populations with the potential to be detrimental to woodland stand health. Adverse direct impacts to forest products may include the disruption and/or removal of rooted vegetation, which may result in a reduction in areas of woodlands and/or a reduction of total numbers of individual trees.

A number of indirect impacts to forest product resources may also be possible as a result of proposed management actions under the alternatives. Most indirect adverse impacts are assumed to result from direct impacts, in proportion to the relative amount of associated surface disturbance. Adverse indirect impacts may include, the disruption and/or reduction of habitat suitable for colonization due to surface disturbance; the introduction of noxious weeds, insects, and/or pathogens by various vectors (or conditions that enhance such organisms); and the general loss of habitat due to surface occupancy, surface compaction, and/or trampling. Failed reclamation or mitigation may also result in indirect impacts to these resources. Beneficial indirect impacts usually result from minimizing or preventing surface disturbance and, therefore, disturbance to woodlands. Direct beneficial impacts to special forest products may include sustaining a biologically diverse landscape that supports a variety of habitats, as well as native plant and animal species.

4.2.13.1. Evaluation Criteria and Assumptions

The most adverse direct impacts to woodlands may result from surface disturbances; therefore, these areas are the primary parameter for discussion and comparison of impacts for special forest products. Quantifying impacts in this way is difficult due to the fact that the location of potential impacts cannot be determined. Additionally, beneficial impacts of improving woodlands may not be realized during the 20-year planning period. In general, areas reclaimed, otherwise improved, and/or protected from ground disturbance are used to describe beneficial impacts. Estimates of surface disturbance areas associated with potential management actions were calculated using data from the AMS (BLM 2005b) and the RFD (BLM 2005c), and are summarized in Table 4-1.

Assumptions included in the analysis of impacts to special forest products include the following:

- Estimated disturbance areas are distributed among all vegetation communities, including woodlands, in proportion to their relative area throughout the Monument, unless otherwise limited by applicable surface-use restrictions and/or other special management considerations.
- Application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E).
- Federal lands within the Monument boundary are the subject of the impact analysis.
- Woodlands, as a component of the Colorado Plateau Semi-desert ecoregion (Bailey 1995), are the subject of the cumulative impacts discussion.

4.2.13.2. Alternative Analysis

Impacts to special forest product resources may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions proposed for forest product resources, as well as those anticipated for cultural resources, fluid minerals, rangeland resources, recreation and transportation, and fuels and fire.

Alternative I (No Action Alternative)

Special Forest Products Management

Commercial forest product sales would not occur under Alternative I. However, private forest product sales would be allowed. Areas for private fuelwood and vegetative use permits would be identified, and would be limited to previously chained pinyon-juniper woodlands to reduce hazardous fuel loads. Timber and wood products from recreation, cultural, public land disposal, and ACEC emphasis areas would be managed to enhance respective values and to maintain healthy pinyon-juniper woodlands. Management of special forest products under Alternative I is expected to result in a continuation of current conditions for these resources.

Cultural Resources Management

Under this alternative, few cultural resource management actions would impact woodlands either directly or indirectly; therefore, continuing management would be expected to result in few, if any, impacts on special forest products. This alternative would allow for the stabilization and in some cases, development, of 240 cultural resource sites, which may result in surface clearance of vegetation at a localized level.

Fluid Minerals Management

Under this alternative, no new fluid minerals leases would be available; therefore, no impacts may be expected.

Rangeland Resources Management

In many allotments, rangeland resources management may be considered one of the reasons for such allotments not meeting the Public Land Health Standards for healthy, productive plant and animal communities and for the downward trend observed in much of the native upland vegetation in the Monument. The current management of rangeland resources, including 8,492 active AUMs on 28 allotments, may continue to be a contributing factor in these trends and, over time, may contribute to adverse impacts to woodlands and forest products, insofar as they comprise the vegetation communities failing to meet Public Land Health Standards.

Recreation and Transportation Management

Due to the restriction on new oil and gas leases, Alternative I may result in relatively few surface impacts from road development. Under this alternative, 149 miles of roads would be open to travel by all means (including travel for administrative purposes and travel necessary to support existing oil and gas leases). This may result in up to 864 acres of surface disturbance of total Monument surface or to the second-lowest road density (0.58 miles per square mile) of any of the alternatives.

These factors may contribute to direct beneficial impacts to all native vegetation over the long-term, including woodlands. Indirectly, opportunities for noxious weed infestations occurring in road verges may be reduced in proportion to the reduction in total road miles. Recreation and transportation management under Alternative I is expected to result in a continuation of current conditions for these resources.

Other Resources Management

In general, it is assumed that vegetation resources management would result in current vegetation resource conditions and trends described in Section 3.1.8, which would continue into the future under these management actions. Therefore, under Alternative I (the No Action Alternative) the condition of woodlands, as one of the three dominant native upland communities, may be expected to continue generally in a stable degraded state or downward trend.

Alternative I may result in the least effective fuels and fire management, when compared with the action alternatives. This may be expected to result in adverse impacts to special forest products and to woodland health, should a wildfire occur.

Alternative II***Special Forest Products Management***

No private or commercial forest product removal would be permitted under Alternative II. Therefore, no impacts to these resources may be expected from direct management. This type of harvest would not be available, as part of fuels management to improve pinyon-juniper woodland health and to reduce fire risk.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact woodland vegetation, either directly or indirectly. However, to some degree, development of 13 sites, testing, and/or other activities under this alternative that results in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

Under Alternative II, indirect beneficial impacts to woodland vegetation may result due to the restriction of direct impacts to cultural resource communities, sites, and/or isolated finds. This restriction may be expected to eventually result in more numerous, larger areas in the Monument to which no direct surface-disturbing impacts would be allowed. This may result in the protection of forest product resources within these areas and may eventually provide widespread beneficial impacts.

Fluid Minerals Management

Under Alternative II, up to 880 acres of land currently unavailable for leasing could be leased. This may result in the development of up to two well pads, with up to 12 acres of long-term disturbance (see Table 4-1). The result of leasing these areas under Alternative II may be limited adverse impacts to woodland resources within localized areas of disturbance. Many of these may be mitigated by application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. However, successful reclamation of woodlands, in terms of available special forest products, may require a much longer time frame than either herbaceous or shrub-dominated plant communities, which may effectively result in adverse impacts over the 20-year planning period.

Rangeland Resources Management

Similar to the other action alternatives, Alternative II would emphasize rangeland management actions with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards. In addition, only Alternative II would consist of a number of management actions that may result in larger and/or more comprehensive beneficial impacts to vegetation, such as reduced AUMs and closed allotments. These may result in beneficial impacts to forest products and woodland health because they comprise a portion of the native vegetation in the Monument.

Recreation and Transportation Management

Alternative II, in terms of transportation management, would be the most restrictive of all of the alternatives, with 139 miles of roads. This alternative may result in the smallest number of acres of disturbance due to roads (806 acres), as well as the lowest road density (0.54 miles per square mile) of any of the alternatives. These factors may contribute to direct beneficial impacts to all native vegetation over the long-term, including special forest products and woodland health. Managing for undeveloped backcountry use may have negligible impacts on woodland health.

Other Resources Management

Similar to the other action alternatives, Alternative II would emphasize vegetation resources management, with several specific management actions not included in Alternative I. Several management actions would focus on vegetation as a resource with specific intrinsic value, instead of only in terms of rangeland or forestry values. In general, these actions may result in beneficial impacts to vegetation resources, including special forest products and woodland health.

Opportunities to meet the goals and objectives of fuels and fire management may be greatly enhanced under Alternative II (as well as under all of the action alternatives), in comparison to Alternative I (the No Action Alternative). This may result in beneficial impacts to special forest products and woodland health, should a wildfire occur.

Alternative III

Special Forest Products Management

No commercial firewood cutting would be authorized under Alternative III. Private fuelwood harvesting (restricted to dead-and-down wood only), pole and fencepost cutting, and Christmas tree harvesting would be allowed by permit only within designated forest product areas.

As under Alternative II, all cutting areas would be designated under a permit system. Cutting areas would be considered open after completion of a Class III cultural resource inventory, and a determination that harvesting activities would not interfere with the proper care and

management of Monument objects. Additional harvest areas within previously disturbed areas, and within 300 feet of a designated road, may be designated to meet overall vegetation management objectives.

The permit system for special forest products under Alternative III would provide the BLM with administrative control of these actions. Harvesting special forest products may result in reducing hazardous fuels, removing unwanted trees to achieve specific management goals, and improving general woodland health. These actions may result in beneficial impacts to these resources.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact woodland vegetation, either directly or indirectly. However, to some degree, development of 13 to 25 sites, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

The requirement under Alternative III for a Class III cultural resources inventory may delay the commercial cutting of fuelwood in some areas. Under Alternative III, indirect beneficial impacts to woodland vegetation may result due to the restriction of direct impacts to cultural resource communities and sites. This restriction may be expected to eventually result in areas in the Monument to which no direct surface-disturbing impacts would be allowed. This may result in the protection of forest product resources and woodlands within these areas, which may eventually provide widespread beneficial impacts.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres could be leased. This may result in up to eight well pads being developed, with up to 57 acres of long-term disturbance. The result of leasing these areas under Alternative III may be more adverse impacts to woodlands and special forest products than those expected under Alternatives I, II and V, but fewer than those expected under Alternative IV. Many of these may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. However, successful reclamation of woodlands, in terms of available special forest products, may require a much longer time frame than either herbaceous or shrub-dominated plant communities, and may effectively result in adverse impacts over the 20-year planning period.

Rangeland Resources Management

Rangeland resources management under Alternative III is very similar to current management, including numbers of active AUMs, except for the closing of five allotments (124 AUMs). AUMs may continue to be an important factor in these trends and, over time, and may contribute to adverse impacts to most of these vegetation communities, as well as failure to meet Public Land Health Standards.

Similar to the other action alternatives, Alternative III would emphasize rangeland management actions with the stated purpose of improving rangeland conditions to achieve Public Land Health Standards. These may result in some beneficial impacts to special forest products and woodland health because they comprise a portion of general native vegetation in the Monument.

Recreation and Transportation Management

Alternative III, in terms of transportation management, would be the second least restrictive of all of the alternatives. Under this alternative, 189 miles of roads would be open to travel by all means (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 1,096 acres of surface disturbance, as well as in the second highest road density (0.73 miles/square mile) of any of the alternatives.

These factors may contribute to adverse impacts to all native vegetation, including woodlands and special forest products, over the long-term due to increased fragmentation of habitat and chances for disturbance impacts. Indirectly, opportunities for noxious weed infestations may increase in proportion to the increased numbers of roads.

Managing for destination opportunities for regional visitors may result in few, if any, impacts to woodland health. Overnight camping and campfires in some SRMAs may create adverse impacts due to the increased risk of wildfire ignitions.

Other Resources Management

Similar to the other action alternatives, Alternative III would emphasize management of vegetation resources, with several specific management actions not included in Alternative I. In general, these may result in beneficial impacts to vegetation resources, including special forest products and woodland health.

Opportunities to meet the goals and objectives of fuels and fire management may be greatly enhanced under Alternative III (as well as under all of the action alternatives), in comparison to Alternative I. This may be expected to result in beneficial impacts to special forest products and woodland health, insofar as they comprise a large component of the general resource protected by these actions.

Alternative IV

Special Forest Products Management

Commercial firewood cutting would be authorized in all areas (except WSAs and RNA) under Alternative IV. Private fuelwood harvesting, pole and fencepost cutting, and Christmas tree harvesting would also be allowed in the same areas. Both dead-and-down wood and live trees would be included in all firewood harvesting

Similar to Alternative IV, all cutting areas would be designated under a permit system. Cutting areas would be considered open after completion of a Class III cultural resource inventory and a determination that harvesting activities would not interfere with the proper care and management of Monument objects. Additional harvest areas within previously disturbed areas, and within 300 feet of a designated road, may be designated to meet overall vegetation management objectives.

Although the permit system for special forest products under Alternative IV would provide the BLM with administrative control of these actions, larger areas open to harvesting, and the use of live trees (as well as dead-and-down) may result in some adverse impacts to these resources and woodlands. However, harvesting special forest products may result in reducing hazardous fuels, removing unwanted trees and to achieve specific management goals, which may improve general woodland health. These may potentially result in both adverse and beneficial impacts to these resources.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact woodland vegetation, either directly or indirectly. However, to some degree, development and stabilization of 13 to 25 sites, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

The requirement under Alternative IV for a Class III cultural resources inventory may delay the commercial cutting of fuelwood in some areas. Indirect beneficial impacts to woodland vegetation may result due to the restriction of any direct impacts to cultural resource communities and sites. This restriction may be expected to eventually result in areas in the Monument to which no direct surface-disturbing impacts would be allowed. This may result in the protection of forest product resources and woodlands within these areas, and eventually provide widespread beneficial impacts.

Fluid Minerals Management

Under Alternative IV, a notably larger number of acres (up to 24,462) could be leased. This may result in up to 59 well pads being developed, with up to 338 acres of long-term disturbance. Leasing these areas may result in considerably more adverse impacts to woodlands, and therefore special forest products, than under any of the other alternatives. Many of these impacts may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. However, successful reclamation of woodlands, in terms of available special forest products, may require a much longer time frame than either herbaceous or shrub-dominated plant communities, and may effectively result in more adverse impacts over the 20-year planning period.

Rangeland Resources Management

Rangeland management under Alternative IV would be similar to current management, including numbers of active AUMs (8,492) and allotments (28 allotments). However, several intense management actions would be included under this alternative. AUMs may continue to be an important factor in range trends and, over time, may contribute to adverse impacts to most of these vegetation communities and possibly to the failure to meet Public Land Health Standards.

Recreation and Transportation Management

Alternative IV, in terms of transportation management, would be the least restrictive of all of the alternatives. Under this alternative, 213 miles of roads would be open to travel by all means (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 1,235 acres of surface disturbance, as well as to the highest road density (0.83 miles per square mile) of any of the alternatives. These factors may contribute to adverse impacts to all vegetation over the long-term due to increased fragmentation of habitat and chances for disturbance impacts.

Marketing the Monument for national and international visitors is not expected to impact woodland health. Overnight camping and campfires in some SRMAs may create adverse impacts due to the increased risk of wildfire ignitions (even though visitors are required to use fire pits, grates, or firepans).

Other Resources Management

Similar to the other action alternatives, Alternative IV would emphasize management of vegetation resources, with several specific management actions not included in Alternative I. In general, these all may result in beneficial impacts to vegetation resources, including special forest products and woodland health.

Opportunities to meet the goals and objectives of fuels and fire management may be greatly enhanced under Alternative IV (as well as under all of the action alternatives), in comparison to Alternative I. This may be expected to result in beneficial impacts to special forest products and woodland health, insofar as it comprises a large component of the general resource protected by these actions.

Alternative V (Preferred Alternative)

Special Forest Products Management

Under Alternative V, private harvesting of special forest products would not be authorized. Commercial fuelwood cutting of live trees and dead-and-down wood would be authorized by permit. Similar to Alternative III and IV, all cutting areas would be designated under a permit system. Cutting areas would be considered open after completion of a Class III cultural resource inventory.

Although the permit system for special forest products under Alternative V would provide the BLM with administrative control of these actions, larger areas open to harvesting, and the use of live trees (as well as dead-and-down), may result in some adverse impacts to these resources and woodlands. However, harvesting special forest products may result in the reduction of hazardous fuels, the removal of unwanted trees to achieve specific management goals, and an improvement in general woodland health.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact woodland vegetation, either directly or indirectly. However, to some degree, development and minimal stabilization of 13 to 25 sites, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would be dependant upon the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

The requirement under Alternative V for a Class III cultural resources inventory may delay the commercial cutting of fuelwood in some areas. Under Alternative V, indirect beneficial impacts to woodland vegetation may result due to the restriction of any direct impacts to cultural resource communities and sites. This restriction may be expected to eventually result in areas in the Monument to which no direct surface-disturbing impacts would be allowed. This may result in the protection of forest product resources and woodlands within these areas, and eventually provide some widespread beneficial impacts.

Fluid Minerals Management

Under Alternative V, up to 880 acres of lands could be leased. This may result in development of up to two well pads, with up to 12 acres of long-term disturbance. The result of leasing these areas under Alternative V may be limited adverse impacts to vegetation resources. Many of these may be mitigated by application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. However, successful reclamation of woodlands, in terms of available special forest products, may require a much longer time frame than either

herbaceous or shrub-dominated plant communities, and may effectively result in adverse impacts over the 20-year planning period.

Rangeland Resources Management

Similar to the other action alternatives, Alternative V would emphasize rangeland management actions, with the stated purpose of improving rangeland conditions for achievement of Public Land Health Standards. Administering a reduction in AUMs (6,437) and closing five allotments (124 AUMs) may result in some beneficial impacts to forest products and woodland health, insofar as they comprise a portion of general native vegetation in the Monument.

Recreation and Transportation Management

Alternative V, in terms of transportation management, falls in the middle of all alternatives. Under this alternative, 169 miles of roads would be open to travel by all means (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 980 acres of surface disturbance, as well as a road density of 0.66 miles per square mile.

These factors may contribute to some adverse direct impacts to all native vegetation over the long-term due to increased fragmentation of habitat and chances of disturbance impacts to special status plant species and significant plant communities. Indirectly, opportunities for noxious weed infestations may increase in proportion to the increased numbers of roads.

Marketing the Monument to a variety of visitors may likely have little or no impact to woodland health. Overnight camping and campfires in some SRMAs may create adverse impacts due to the increased risk of wildfire ignitions.

Other Resources Management

Similar to the other action alternatives, Alternative V would emphasize management of vegetation resources, with several specific management actions not included in Alternative I. Several management actions would focus on vegetation as a resource with specific intrinsic value, instead of only in terms of rangeland or forestry values. In general, these all may result in beneficial impacts to vegetation resources, including special forest products and woodland health.

Opportunities to meet the goals and objectives of fuels and fire management may be greatly enhanced under Alternative V (as well as under all of the action alternatives), in comparison to Alternative I. This may be expected to result in beneficial impacts to special forest products and woodland health, should a wildfire occur.

4.2.13.3. Special Forest Products Management Impact Comparison

The special forest products impact comparison is presented in Table 4-21. This table compares the consequences of resource management actions under each alternative on special forest products.

4.2.13.4. Cumulative Impacts

Restrictions on harvesting fuelwood, Christmas trees, or other forest products in the Monument may result in greater demand for these products from neighboring public lands. For those living near the Monument, this may require more travel time and distance to obtain these products.

As a result of not removing firewood and other forest products from the Monument, a greater reliance on prescribed fire and mechanical fuels treatment may be required to reduce the risk of wildfire. A greater demand for forest products off the Monument may result in more roads and

impacts from cross-country travel (i.e. erosion and sedimentation), and reduced risk of fire, on neighboring public lands.

Table 4-21 Comparison of Impacts to Special Forest Products

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Special Forest Products	Allow no commercial permits.	Allow no forest product removal.	Allow personal fuelwood harvesting, post cutting, and Christmas tree cutting. Authorize no commercial permits.	Allow personal fuelwood harvesting, post cutting, and Christmas tree cutting. Authorize commercial permits.	Allow no personal fuelwood harvesting. Authorize commercial permits.
Cultural Resources	Develop new sites for controlled visitation (with localized clearing of woodlands).	Develop 13 sites (with localized clearing of woodlands).	Develop 13 to 25 sites (with localized clearing of woodlands).	Develop 13 to 25 sites (with localized clearing of woodlands).	Develop 13 to 25 sites (with localized clearing of woodlands).
Fluid Minerals	No Impact.	Make up to 880 acres available for new leases. Allow up to 2 new well pads (with up to 18 acres of disturbance).	Make up to 3,021 acres available for new leases. Allow up to 8 new well pads (with up to 73 acres of disturbance).	Make up to 24,462 acres available for new leases. Allow up to 59 new well pads (with up to 447 acres of disturbance).	Make up to 880 acres available for new leases. Allow up to 2 new well pads (with up to 8 acres of disturbance).
Rangeland Resources	Permit 8,492 active AUMs. Manage 28 allotments.	Permit 6,437 active AUMs. Manage 23 allotments.	Permit 8,368 active AUMs. Manage 23 allotments.	Permit 8,492 active AUMs. Manage 28 allotments.	Permit 6,437 active AUMs. Manage 23 allotments.
Recreation and Transportation	Manage 149 miles total road miles (with 897 acres of disturbance), 0.58 miles per square mile road density.	Manage 139 miles total road miles (with 806 acres of disturbance), 0.54 miles per square mile road density.	Manage 189 miles total road miles (with 1,096 acres of disturbance), 0.73 miles per square mile road density.	Manage 213 miles total road miles (with 1,235 acres of disturbance), 0.83 miles per square mile road density.	Manage 169 miles total road miles (with 980 acres of disturbance), 0.66 miles per square mile road density.

Table 4-21 Comparison of Impacts to Special Forest Products

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Other Resources: Vegetation Resources	No specific vegetation treatments planned.	Encourage vegetation treatments. Manage past pinyon-juniper chaining areas to improve ecological condition.	Encourage vegetation treatments. Manage past pinyon-juniper chaining areas to improve ecological condition.	Encourage vegetation treatments. Manage past pinyon-juniper chaining areas to improve ecological condition.	Encourage vegetation treatments. Manage past pinyon-juniper chaining areas to improve ecological condition.
Other Resources: Fuels and Fire	More likely to have large-scale fires.	Fires generally site-specific and short-term.			

4.2.14. Lands and Realty

The primary goals for lands and realty in the Monument are to use land tenure adjustments to protect objects identified in the Proclamation, to improve management, and to reduce administrative costs. The management objectives related to these goals include:

- identify private land within and/or adjacent to the Monument boundary for possible acquisition from willing sellers, if the acquisition would contribute to achieving cultural and/or natural resource goals and objectives; and
- work with landowners to resolve encroachment issues.

Another goal for lands and realty is to develop ROWs to accommodate facilities supporting multiple-use activities while, at the same time, protecting objects identified in the Proclamation. The management objectives related to this goal include:

- manage commercial filming to assist in achieving resource protection goals and objectives; and
- manage non-recreational, competitive, and special events to assist in achieving resource protection goals and objectives.

Approximately 17,541 acres within the Monument boundary are privately owned land. These lands consist of about 45 parcels of relatively large, isolated tracts of land under approximately 31 different ownerships. These private-land parcels range in size from about 30 acres to several thousand acres. The 313-mile Monument perimeter lies adjacent to approximately 250 landowners in Montezuma County, and to an unknown number in Dolores County. There are 75 ROWs that encompass approximately 1,219 acres.

In accordance with the Proclamation, the BLM may not dispose of any Monument land; however, the BLM may acquire inholdings. In accordance with the FLPMA, the BLM is authorized to convey or acquire partial interests, including water or mineral rights, access easements for roads or trails, certain improvements, and/or conservation easements.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to lands and realty.

Direct adverse impacts to lands and realty may include the illegal encroachment of private land uses onto the Monument. Beneficial impacts may include acquiring inholdings or mitigating utility corridors to enhance the objects of the Monument.

4.2.14.1. Evaluation Criteria and Assumptions

Quantifying individual impacts to lands and realty is difficult due to the fact that acquisition of inholdings and location of all ROWs cannot be determined. It is difficult to quantify impacts to lands and realty because there are no standard impacts that can be predicted and measured across each alternative.

Assumptions used in analyzing impacts to facilities and infrastructure resource uses include the following:

- New ROWs will be needed for oil and gas development and/or for mineral development.
- Cutting of canyon rims includes allowing development, typically fluid minerals development, to develop along canyon rims, which often requires road cuts and/or pipeline cuts.

- The impacts analysis boundary for both individual and cumulative analyses is the Monument and the immediate adjoining lands.

4.2.14.2. Alternative Analysis

Impacts to lands and realty may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for land and realty, as well as those anticipated for cultural resources, fluid minerals, rangeland resources, and recreation and transportation management.

Alternative I (No Action Alternative)

Lands and Realty Management

Under Alternative I, lands and realty management would include responding positively to private land sale offers (with willing sellers) on and adjacent to the Monument, pursuing easements, providing reasonable access to private parcels, identifying existing and potential ROW corridors, identifying terms and conditions for underground and/or aerial corridors, conducting a survey of the Monument boundary, and managing commercial filming and non-recreational special events to assist in achieving resource protection goals and objectives. Utility corridors would be allowed with protective stipulations; however, existing ROWs would be used as much as possible. Blasting and/or cutting of canyon rims would be avoided.

There may be beneficial impacts of this management because existing ROWs would be used as much as possible, and new ROWs would be subject to protective stipulations. Additionally, acquisition of inholdings and adjacent lands may further protect Monument resources.

Cultural Resources Management

Cultural resources management under Alternative I would include developing new sites and areas with controlled visitation and various levels of interpretation, managing data and collected material to enhance public awareness of resources through interpretation by the AHC, and developing and protecting suitable cultural resources for public enjoyment. There may be no impacts from cultural resources management in relation to lands and realty uses.

Fluid Minerals Management

Under this alternative, the management of fluid minerals on lands and realty would include authorizing facilities in support of oil and gas development. Fluid minerals development would require ROWs for pipelines and transmission corridors, and roads for transportation to and from exploration and production areas. Under Alternative I, no new leases and, consequently, no new well pads or facilities would be anticipated; therefore, there may be no impacts from fluid minerals development in relation to lands and realty.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. This management may not have any impact on lands and realty.

Recreation and Transportation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, as well as maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. No new SRPs would be issued. Recreation management may not impact lands and realty.

Under this alternative, the Monument travel system would include 149 miles (864 acres) of roads for motorized, mechanized, and/or non-motorized use, and seven supporting facilities. Cross-country motorized and mechanized travel would be prohibited. This alternative may result in adverse impacts to land and realty due to the fact that existing ROWs may not accommodate anticipated roads.

Other Resources Management

Under this alternative, a soil SSR/CSU would be applied for slopes greater than 40 percent, (21,036 acres). Limiting the location and acreage available for roads and utilities may result in beneficial impacts to lands and realty by reducing surface disturbance and areas available for new ROWs.

Alternative II***Lands and Realty Management***

Under Alternative II, lands and realty management would include including responding positively to private land sale offers (with willing sellers) on and adjacent to the Monument, pursuing easements, providing reasonable access to private parcels, identifying existing and potential ROW corridors, identifying terms and conditions for underground and/or aerial corridors, conducting a survey of the Monument boundary, and managing commercial filming and non-recreational competitive and special events to assist in achieving resource protection goals and objectives. Under Alternative II, the BLM would:

- pursue acquisition or exchange of private holdings from willing sellers within and adjacent to the Monument;
- identify and prioritize a list of easements, develop a boundary management plan and pursue cost-sharing agreements with private landowners to survey boundaries;
- prohibit commercial filming and non-recreational competitive and special events, except for education purposes relative to the Monument;
- prohibit new ROWs in RMZ 5, except for access to private land, and major utility ROW corridors;
- prohibit new renewable energy projects, construction of new communication sites, blasting and/or cutting near canyon rims, and strobe lights on communication sites;
- require that road development be kept to an absolute minimum and that new ROWs comply with all NGD/NSO and SSR/CSU requirements;
- require that existing ROWs be used when constructing new facilities;
- align new ROWs adjacent to existing ROWs; and
- require that reconstructed and future powerlines meet non-electrocution standards for raptors, and that new powerlines meet visual resource objectives.

The impacts of this management may be beneficial because existing ROWs would be used as much as possible, and restrictions on new ROWs (construction and stipulations) may reduce surface disturbance and, therefore, preserve Monument objects. Additionally, acquisition of inholdings and adjacent lands may further protect Monument resources.

Cultural Resources Management

Cultural resources management under Alternative II would include allocating 13 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and

evaluating SRPs for site visits. There may be no impacts from cultural resources management in relation to lands and realty uses.

Fluid Minerals Management

Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be included in COAs for new leases.

Under Alternative II, fluid minerals management may result in adverse impacts to land and realty due to the fact that existing ROWs would probably not accommodate anticipated roads and pipelines.

Rangeland Resources Management

Rangeland resources, under Alternative II, would be managed to improve Public Land Health Standards and to protect Monument objects. This management may not have any impact on lands and realty.

Recreation and Transportation Management

Under Alternative II, recreation management would include managing for custodial purposes, user conflicts, visitor safety, and resource protection. Developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos would be maintained. Approximately 8,211 acres would be managed for public visitation, and 157,124 acres would be managed for backcountry use. No new SRPs would be issued, and existing SRPs would be allowed to expire. Recreation management under this alternative may have less impact to lands and realty due to the fact that fewer sites would be developed, with fewer associated infrastructure and roads, which may result in less ground disturbance and greater protection of Monument resources.

Under this alternative, the Monument travel system would include 139 miles (806 acres) of roads for motorized, mechanized, and/or non-motorized use, along with seven support facilities. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel; these forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Transportation management under this alternative may result in beneficial impacts to lands and realty due to the fact that although ROWs may still be needed, fewer may be needed to accommodate the reduced development.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to lands and realty due to the fact that there may be less surface disturbance and that Monument objects would be protected.

Alternative III

Lands and Realty Management

Under Alternative III, lands and realty management would include responding positively to private land sale offers (with willing sellers) on and adjacent to the Monument, pursuing easements, providing reasonable access to private parcels, identifying existing and potential

ROW corridors, identifying terms and conditions for underground and/or aerial corridors, conducting a survey of the Monument boundary, and managing commercial filming and non-recreational competitive and special events to assist in achieving resource protection goals and objectives. Under Alternative III, the BLM would conduct the following:

- pursue acquisition or exchange of private holdings from willing holders within and adjacent to the Monument;
- identify and prioritize a list of easements, develop a boundary management plan, and pursue cost-sharing agreements with private landowners to survey boundaries;
- prohibit commercial filming and non-recreational competitive and special events, except for education purposes relative to the Monument;
- prohibit new ROWs in RMZ 5, except for access to private land, and major utility ROW corridors;
- prohibit blasting and/or cutting near canyon rims, and strobe lights on communication sites;
- require that road development be kept to an absolute minimum, and that new ROWs comply with all NGD/NSO and SSR/CSU requirements;
- require that existing ROWs be used when constructing new facilities;
- required that new ROWs be aligned adjacent to existing ROWs;
- require that reconstructed and future powerlines meet non-electrocution standards for raptors, and that new powerlines meet visual resource objectives;
- allow major utility ROW corridors within or adjacent to the existing 230 kV aerial power line ROW; and
- require that new renewable energy projects and communication sites develop a Monument-wide feasibility study to determine appropriate locations.

The impacts of this management may be beneficial because existing ROWs would be used as much as possible and restrictions on new ROWs (construction and stipulations) may reduce surface disturbance and, therefore, preserve Monument objects. Additionally, acquisition of inholdings and adjacent lands may further protect Monument resources.

Cultural Resources Management

Cultural resources management under Alternative III would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. There may be no impacts of cultural resource management on lands and realty uses.

Fluid Minerals Management

Under Alternative III, new leases would have NGD/NSO stipulations to protect cultural, natural, and scenic resources, and Monument objects. Under Alternative III, up to 3,021 acres would be available for leasing, and up to three miles of new roads would be required for this development. A total of up to 73 acres of new ground disturbance associated with eight new well pads may be possible under this alternative. Fluid minerals facilities may include pipelines, support structures, and/or utilities. Geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. The management of fluid minerals may include authorizing facilities in support of oil and gas development. Soil resource NGD/NSO

stipulations for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be included in COAs for new leases.

Rangeland Resources Management

Rangeland resources, under Alternative III, would be managed to improve Public Land Health Standards and to protect Monument objects. This management would not have any impacts in relation to lands and realty.

Recreation and Transportation Management

Under Alternative III, recreation management would include a destination management strategy, including establishing destinations for regional visitors, actively marketing communities in the Four Corners area, providing specific public access points, and appropriate support facilities. Approximately 18,875 acres would be managed for public visitation, and 146,460 acres would be managed for backcountry use. No new SRPs would be issued, and existing SRPs could be renewed. Recreation management may have adverse impacts to lands and realty due to the fact that more developed sites, as well as the associated infrastructure and roads, may result in increased ground disturbance.

Under this alternative, the Monument travel system would include 189 miles (1,096 acres) of roads for motorized, mechanized, and/or non-motorized use, and would include 13 support facilities. There would be roads specifically designated for OHV, mountain bike, or dirt bike. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Transportation management may result in adverse impacts to lands and realty due to the fact that additional ROWs may be needed to accommodate development, which may, in turn, increase ground disturbance.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to lands and realty due to the fact that surface disturbance may be decreased, and that Monument objects would be protected.

Alternative IV

Lands and Realty Management

Under Alternative IV, lands and realty management would include responding positively to private land sale offers (with willing sellers) on and adjacent to the Monument, pursuing easements, providing reasonable access to private parcels, identifying existing and potential ROW corridors, identifying terms and conditions for underground and/or aerial corridors, conducting a survey of the Monument boundary, and managing commercial filming and non-recreational competitive and special events to assist in achieving resource protection goals and objectives. Under Alternative IV, the BLM would conduct the following:

- pursue acquisition or exchange of private holdings from willing sellers within and adjacent to the Monument;
- identify and prioritize a list of needed easements for public use or BLM administrative access, develop a boundary management plan, and pursue cost-sharing agreements with private landowners to survey boundaries;
- prohibit commercial filming and non-recreational competitive and special events, except for education purposes relative to the Monument;

- prohibit new ROWs in RMZ 5, except for access to private land;
- prohibit blasting and/or cutting near canyon rims, and strobe lights on communication sites;
- require that road development be kept to an absolute minimum and that new ROWs comply with all NGD/NSO and SSR/CSU requirements;
- require that existing ROWs be used when constructing new facilities;
- require that new ROWs be aligned adjacent to existing ROWs;
- require that reconstructed and future powerlines meet non-electrocution standards for raptors, and that new powerlines meet visual resource objectives;
- allow major utility ROW corridors within or adjacent to the existing 230 kV aerial power line ROW; and
- require that new renewable energy projects and communication sites develop a Monument-wide feasibility study to determine appropriate locations.

The impacts of this management may be beneficial because existing ROWs would be used as much as possible and restrictions on new ROWs (construction and stipulations) may reduce surface disturbance and, therefore, preserve Monument objects. Additionally, acquisition of inholdings and adjacent lands may further protect Monument resources.

Cultural Resources Management

Under Alternative IV, cultural resources management would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. There may be no impacts of cultural resource management in relation to lands and realty uses.

Fluid Minerals Management

Under Alternative IV, new oil and gas leases would have NGD/NSO stipulations that protect cultural, natural, and scenic resources, and Monument objects. Under Alternative IV, up to 24,462 acres would be available for leasing. A total of up to 447 acres of new ground disturbance, including up to 19 miles of new roads, would be possible under this alternative.

In accordance with applicable laws and regulations, seismic operation-related work using bulldozers and/or other earthmoving equipment, as necessary, would be allowed to mitigate impacts to objects identified in the Proclamation. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be included in COAs for new leases.

Under Alternative IV, fluid minerals management may result in adverse impacts to land and realty due to the fact that existing ROWs may not accommodate anticipated roads and pipelines.

Rangeland Resources Management

Under Alternative IV, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. This management may not have any impact on lands and realty.

Recreation and Transportation Management

Under Alternative IV, recreation management would include a destination management strategy that markets to national and international visitors; and provides specific public access points,

visitor facilities, access, and appropriate support facilities. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. New SRPs would be issued on a case-by-case basis. Recreation management may have adverse impacts to lands and realty due to the fact that the number of developed sites, along with the associated infrastructure and roads, may increase, which may, in turn, result in increased ground disturbance.

Under this alternative, the Monument travel system would include 213 miles (1,235 acres) of roads for motorized, mechanized, and/or non-motorized use, and would include 20 support facilities. There would be roads specifically designated for OHV, mountain bike, or dirt bike. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Under this alternative, transportation management may result in adverse impacts to lands and realty due to the fact that additional ROWs may be needed to accommodate development, which may, in turn, increase ground disturbance and decrease preservation of Monument resources.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along with the BMPs, may result in beneficial impacts to lands and realty due to the fact that Monument objects would be protected.

Alternative V (Preferred Alternative)

Lands and Realty Management

Lands and realty management, under Alternative V, would include responding positively to private land sale offers (with willing sellers) on and adjacent to the Monument, pursuing easements, providing reasonable access to private parcels, identifying existing and potential ROW corridors, identifying terms and conditions for underground and/or aerial corridors, conducting a survey of the Monument boundary, and managing commercial filming and non-recreational competitive and special events to assist in achieving resource protection goals and objectives. Under Alternative V, the BLM would conduct the following:

- pursue acquisition or exchange of private holdings from willing sellers within and adjacent to the Monument;
- identify and prioritize a list of needed easements for public use or BLM administrative access, develop a boundary management plan, and pursue cost-sharing agreements with private landowners to survey boundaries;
- prohibit commercial filming and non-recreational competitive and special events, except for education purposes relative to the Monument;
- prohibit new ROWs in RMZ 5, except for access to private land;
- prohibit major utility ROW corridors, new renewable energy projects, construction of new communication sites, blasting and/or cutting near canyon rims, and strobe lights on communication sites;
- require that road development be kept to an absolute minimum and that new ROWs comply with all NGD/NSO and SSR/CSU requirements;
- require that existing ROWs be used when constructing new facilities;
- require that new ROWs be aligned adjacent to existing ROWs; and

- require that reconstructed and future powerlines meet non-electrocution standards for raptors, and that new powerlines meet visual resource objectives.

The impacts of this management may be beneficial because existing ROWs would be used as much as possible and restrictions on new ROWs (construction and stipulations) may reduce visitor access and, therefore, preserve Monument objects. Additionally, acquisition of inholdings and adjacent lands may further protect Monument resources and decrease administrative costs.

Cultural Resources Management

Cultural resources management, under Alternative V, would include allocating 13 to 25 sites to Public Use D (Developed), preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. There may be no impacts of cultural resources management in relation to lands and realty uses.

Fluid Minerals Management

Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative. Additional infrastructure, including roads and utilities as well as offsite infrastructure, may be required for fluid minerals development. Under Alternative II, two new well pads may be developed.

Under this alternative, geophysical operations would be restricted to BLM-defined roads. Temporary access roads would require reclamation. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be included in COAs for new leases. Under Alternative V, fluid minerals management may result in adverse impacts to land and realty because existing ROWs may not accommodate anticipated roads and pipelines.

Rangeland Resources Management

Rangeland resources, under Alternative V, would be managed to improve Public Land Health Standards, to reduce or control grazing, and to protect Monument objects. This management may not have any impact on lands and realty.

Recreation and Transportation Management

Under Alternative V, recreation management would include a combination of strategies, including undeveloped areas with minimal facilities and destination management strategies for Painted Hand and Sand Canyon Pueblos, the AHC, and Lowry Pueblo RMZs. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. A limit of 10 SRPs would be issued.

Under this alternative, the Monument travel system would include 169 miles (980 acres) of roads for motorized, mechanized, and/or non-motorized use, and would include 11 support facilities. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Under this alternative, transportation management may result in adverse impacts to lands and realty because additional ROWs may be needed to accommodate development.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This restriction, along

with the BMPs, may result in beneficial impacts to lands and realty due to the fact that Monument objects would be protected.

4.2.14.3. Lands and Realty Management Impact Comparison

A summary of impacts to lands and realty is presented in Table 4-22. This table compares the consequences of resource management actions under each alternative on lands and realty.

4.2.14.4. Cumulative Impacts

Activities on private land within, and adjacent to, the Monument may have cumulative impacts on lands and realty. As agriculture lands adjacent to the Monument become subdivided and developed, there may be a greater risk of encroachment onto public lands. In addition, access needs and request for ROWs may increase. Issues with fencing and water development may likely increase, as well. Oil and gas development, both on and off the Monument, may require more ROWs for utilities, pipelines, and/or for roads.

As development of lands adjacent to the Monument increases, visual impacts to the natural landscape may occur. The construction of buildings, roads and associated structures would result in ground disturbance and may cause a loss of wildlife habitat and the possibility for erosion with additional sediments in stream systems. Noise levels from increased human presence (voices and vehicular) may reduce wildlife habitat security.

Table 4-22 Comparison of Impacts to Lands and Realty

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Lands and Realty	Allow major utility corridors, with protective stipulations. Allow other land actions when clear significant public need.	Prohibit major utility ROW corridors. Prohibit construction of new renewable energy projects and new communications sites.	Allow major utility ROW corridors only within or adjacent to existing ROWs. Prepare feasibility study prior to authorizing new renewable energy or communication site projects.	Allow major utility corridors with protective stipulations. Prepare feasibility study prior to authorizing new renewable energy or communication site projects.	Prohibit major utility ROW corridors. Prohibit construction of new renewable energy projects and new communications sites.
Cultural Resources	Protect cultural sites. Develop new sites for controlled visitation.	Protect cultural communities, sites, and isolated finds. Develop 13 sites.	Protect cultural communities and sites. Develop 13 to 25 sites.	Protect cultural communities and sites. Develop 13 to 25 sites.	Protect cultural communities and sites. Develop 13 to 25 sites.
Fluid Minerals	No Impact.	Make up to 880 acres available for leasing.	Make up to 3,021 acres available for leasing.	Make up to 24,462 acres available for leasing.	Make up to 880 acres available for leasing.
Rangeland Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Recreation and Transportation	Allow 7 transportation facilities. Allow ROWs for 149 miles of roads.	Allow 7 transportation facilities. Allow ROWs for 139 miles of roads.	Allow 13 transportation facilities. Allow ROWs for 189 miles of roads.	Allow 20 transportation facilities. Allow ROWs for 213 miles of roads.	Allow 11 transportation facilities. Allow ROWs for 169 miles of roads.
Other Resources: Soil Resources	Apply SSR/CSU to protect slopes greater	Apply NGD/NSO stipulation for slopes	Apply NGD/NSO stipulation for slopes	Apply NGD/NSO stipulation for slopes	Apply NGD/NSO stipulation for slopes

Table 4-22 Comparison of Impacts to Lands and Realty					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
	than 40 percent (21,036 acres).	steeper than 30 percent (36,504 acres).	steeper than 30 percent (36,504 acres).	steeper than 30 percent (36,504 acres).	steeper than 30 percent (36,504 acres).

4.2.15. Minerals**Fluid Minerals**

The primary goal for managing fluid minerals is to ensure the proper care and management of the objects protected under the Proclamation prior to authorizing continued exploration, development, production, and/or reclamation activity. The management objectives related to this goal include:

- determine if any of the 34,221 acres of unleased mineral estate in the Monument should be leased to promote conservation of oil and gas resources in any common reservoir now being produced under existing leases to protect against drainage;
- identify stipulations for new leases to ensure that impacts are not created that interfere with the proper care and management of the objects protected by the Proclamation; and
- identify stipulations and BMPs for exploration, development, production, and reclamation to ensure that impacts are not created that interfere with the proper care and management of the objects protected by the Proclamation.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to fluid minerals management.

Beneficial impacts may include those actions that may enhance extraction efforts. Adverse impacts to fluid minerals resource extraction may include the inability to reach reserves and/or restrictions that make mineral extraction costly. Direct impacts may include the removal of ground from availability for exploration where restrictions, such as TLs or NSO stipulations that complicate the ability to extract fluid minerals, are in place

The BLM prepared a RFD for the Monument (BLM 2005c), which estimated that 57 percent of all oil and natural gas wells, and 100 percent of CO₂ wells, would be successful. The RFD also estimated the gross surface disturbance associated with oil and gas development. Drilling operations may result in surface disturbance for well pads and access roads, for both successful wells and for dry holes. Successful wells may require pipelines, treatment facilities, and ancillary infrastructure to support the increased production. Table 4-23 presents the total number of wells estimated to be drilled on the currently unleased Federal mineral estate over the 20-year planning period, and the area of temporary and long-term surface disturbance associated with each alternative.

	Alternative (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Total Area Effectively Available for New Fluid Mineral Surface Facilities ¹	0 acres	Up to 880 acres	Up to 3,021 acres	Up to 24,462 acres	Up to 880 acres
Estimated Total New Oil and Gas Wells (Unsuccessful) in 20 Years ²	0	1 (0)	3 (1)	21 (9)	1 (0)

Table 4-23 Surface Impacts of Fluid Minerals Development on Currently Unleased Federal and Split-Minerals Estate Over 20-Year Planning Period

	Alternative (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Estimated Total New CO ₂ Wells in 20 Years	0	1	5	38	1
Estimated New Roads on New Leased Lands	0	1 mile	3 miles	19 miles	1 mile
20-yr Long-term Disturbance	0 acres	18 acres	73 acres	447 acres	18 acres
<p><i>1 Area of Federal and split-mineral estates currently not leased that may be made available for leasing under action alternatives. For oil and gas leases under Alternative III, this area is estimated to be the minimum necessary to prevent drainage only. Under Alternative II, this area is limited to currently unleased areas within the McElmo Dome Unit.</i></p> <p><i>2 Number in parentheses represents estimated unsuccessful wells (dry holes) as a subset of the total. These are used to calculate temporary disturbance areas.</i></p>					

4.2.15.1. Evaluation Criteria and Assumptions

Criteria used to compare alternatives include the number of acres available for new leases and, the estimated numbers of successful wells. Impacts may also be expressed in terms of costs and/or restrictions. Assumptions used in analyzing impacts to fluid minerals resource use include the following:

- **Alternative I:** No new leases would be granted by the BLM under this alternative, as required by the 2002 Stipulated Settlement Agreement between the San Juan Citizens Alliance and the BLM (SJCA v. Gale Norton 2002).
- **Alternatives II and V:** With up to 880 acres of currently unleased acreage available for new leases under these alternatives, and assuming a spacing of 640 acres for each CO₂ well, up to one new CO₂ well would be drilled on currently unleased acreage.
- **Alternative III:** With up to 3,021 acres of currently unleased acreage available for new leases under this alternative, three new oil and natural gas wells are estimated to be drilled. Using the CO₂ assumption described in Alternative II, five new CO₂ wells may also be drilled over the next 20 years.
- **Alternative IV:** The assumed 640-acre spacing for CO₂ would apply to the total available unleased acreage, and 38 new CO₂ wells may be drilled under this alternative.
- The Monument contains the highest known density of archaeological sites in the United States, with approximately 5,157 previously recorded cultural sites, and with portions of the Monument containing more than 100 cultural sites per square mile. It is estimated that the total number of sites in the Monument may range from 20,000 to 30,000.
- The average cost per acre for a Class III archaeological survey in the Monument is estimated to be \$50.
- In order to provide a reasonable range of alternatives for analysis purposes, Alternatives I and IV were included. However, both are considered not viable options. Alternative I is not valid because the BLM must at least lease for drainage purposes and Alternative IV is not valid because protecting the objects of the Monument and leasing the full 24,462 acres with an NSO for cultural resource protection is considered not feasible.

4.2.15.2. Alternative Analysis

Impacts to fluid minerals management may differ in extent and severity, depending on specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for fluid minerals, as well as those anticipated to result from the management actions proposed for cultural resources, rangeland resources, and recreation and transportation management.

Alternative I (No Action Alternative)

Fluid Minerals Management

Fluid minerals leasing, and oil, natural gas, and CO₂ exploration and development activities under this alternative would be constrained by the existing 2002 Stipulated Settlement Agreement (San Juan Citizens Alliance et al. vs. Gale Norton et al.), in which the parties agreed that “decisions pertaining to future oil and gas leasing in the Monument shall be deferred by BLM until completion of the RMP EIS.” Out of the current 24,462 acres of unleased Federal and split-mineral estate lands available, none would be leased, and no oil, gas, or CO₂ development would take place. This includes lands that could be leased to promote conservation of oil and gas resources from common reservoirs now being produced to protect against drainage. This is because the Agreement provides that the “RMP EIS shall present the known bounds of common reservoirs that produced under existing leases on the date of the Proclamation, and shall analyze alternative measures to protect against drainage.”

Cultural Resources Management

This alternative would not result in new fluid minerals leases or in any associated ground-disturbing activities from well pads, access roads, and/or facilities; therefore, cultural resources management would have no impact on fluid minerals resource use.

Rangeland Resources Management

Alternative I would not result in new fluid minerals leases or in any associated well pads, access roads, and/or facilities; therefore, rangeland resources management would have no impact on fluid minerals resource use.

Recreation and Transportation Management

This alternative would not result in new fluid minerals leases or in any construction of new roads requiring access control and/or maintenance; therefore, recreation and transportation management would have no impact on fluid minerals resource use.

Alternative II

Fluid Minerals Management

Under this alternative, new fluid minerals leasing would be limited to up to a total of 880 acres, with the specific purpose of protecting against drainage. This management action may result in one oil and gas well, and one CO₂ well being drilled over the 20 years on currently unleased Federal and split-mineral estate lands. Construction of well pads and access roads to service these wells may result in long-term surface disturbance totaling up to 18 acres, with up to one mile of access roads.

Cultural Resources Management

Under this alternative, the BLM would require a Class III cultural resources inventory for lands subject to ground-disturbing activities. Monitoring of ground-disturbing activities would be required, and post-project monitoring may also be required, at the discretion of the BLM. Under

this alternative, no direct impacts to cultural resource communities, sites, and/or isolated finds would be allowed. This would result in large blocks of ground where disturbance would be prohibited.

The impact of cultural resources management on fluid minerals development may include increased cost and, potentially, significant time delays for project implementation. The cost of a Class III cultural resources survey for the 18 acres of surface disturbance for this alternative is estimated to be less than \$1,000. In addition, the time necessary to obtain a favorable determination for APD approval would be longer.

Rangeland Resources Management

Under this alternative, rangeland resources management does not include any management actions that would impact fluid minerals management.

Recreation and Transportation Management

The 139 miles of roads under this alternative would service fluid minerals development in the Monument as well as recreation needs. Conflicts between mixed uses on some of these roads may occur. The two wells projected to be drilled may contribute up to one mile of road to this total. The impact of transportation management under this alternative includes access restrictions, maintenance and upkeep, and installation of erosion control measures.

Alternative III

Fluid Minerals Management

Under this alternative, new fluid minerals leasing would be limited to up to 3,021 acres of the Leadville and Paradox Formations within the McElmo Dome Unit, a common reservoir currently under production in existing leases. Management actions under Alternative III may result in up to three oil and natural gas, and up to five CO₂ wells being drilled during the planning period. Based on historical data, two of these wells would be successful and may have long-term surface disturbance, while one well would be a dry hole (where the surface disturbance would be immediately reclaimed). The up to five CO₂ wells may result in long-term disturbance. Long-term surface disturbance is estimated to cover up to 73 acres, with up to three miles of access roads.

Cultural Resources Management

Under this alternative, the BLM would require a Class III cultural resources inventory for lands subject to ground-disturbing activities. Monitoring of ground-disturbing activities would be required, and post-project monitoring may also be required, at the discretion of the BLM. Under this alternative, no direct impacts to cultural resource communities and/or sites would be allowed. This would result in large blocks of ground prohibited from disturbance.

The impacts of cultural resources management on fluid minerals development may include increased cost and, potentially, significant time delays for project implementation. The cost of a Class III cultural resources survey for the 73 acres of surface disturbance is estimated at approximately \$3,000. This alternative may also result in additional CO₂ production facilities, and the resulting additional cost may adversely impact the economics of development projects. The time necessary to obtain a favorable determination for APD approval would be longer.

Rangeland Resources Management

Under this alternative, rangeland resources management would not include any management actions that would impact fluid minerals management.

Recreation and Transportation Management

The 189 miles of roads under this alternative would service fluid minerals development in the Monument as well as recreation needs. Conflicts between mixed uses on some of these roads may occur. The eight wells projected to be drilled may contribute up to three miles to this total. The adverse impact of transportation management under this alternative, including access restrictions, maintenance and upkeep, and installation of erosion control measures, may be minor.

Alternative IV***Fluid Minerals Management***

Under this alternative, up to 24,462 acres in the Monument would be available for leasing. The BLM has estimated that this alternative may result in up to 21 new oil and natural gas wells, and 38 new CO₂ wells being drilled on currently unleased acreage during the planning period. For oil and natural gas wells, the BLM expects that 12 wells would be successful, resulting in long-term surface disturbance, and that nine wells would be dry holes. All of the 38 CO₂ wells would be successful wells. Surface disturbance is estimated at up to 447 acres, with 19 miles of access roads being built to service new wells. This management may represent the most beneficial impacts to fluid minerals management because more area would be available for development.

Cultural Resources Management

Under this alternative, the BLM would require a Class III cultural resources inventory for lands subject to ground-disturbing activities. Monitoring of ground-disturbing activities would be required, and post-project monitoring may also be required at the discretion of the BLM. Under this alternative, no direct impacts to cultural resources communities and/or sites would be allowed.

The impact of cultural resources management on fluid minerals development may be increased cost and, potentially, time delays for project implementation. The cost of a Class III cultural resources survey for the up to 447 acres of surface disturbance for this alternative is estimated to be \$17,000. In addition, the time necessary to obtain a favorable determination for APD approval may be longer.

Rangeland Resources Management

Under this alternative, rangeland resources management does not include any management actions that would impact fluid minerals management.

Recreation and Transportation Management

The 213 miles of roads under this alternative would service fluid minerals development in the Monument as well as recreation needs. Conflicts between mixed uses on some of these roads may occur. Recreation management may impact fluid minerals development because more area would be allocated to front country recreational activities, which may draw more traffic. The 59 wells projected to be drilled may contribute up to 19 miles to this total. Transportation management under this alternative, including access restrictions, maintenance and upkeep, installation of erosion control measures, and administrative oversight of road operations, may increase proportionately.

Alternative V (Preferred Alternative)

Fluid Minerals Management

Alternative V would limit new leasing of the currently unleased Federal mineral estate to up to 880 acres, with the specific purpose of protecting against drainage. Even if additional lands are acquired, no more than up to 880 acres would be leased. This management action may result in up to one oil and gas well and in one CO₂ well being drilled over the next 20 years. Construction of well pads and access roads to service these wells may result in surface disturbance totaling up to 18 acres, with up to one mile of access road.

Cultural Resources Management

Under this alternative, the BLM would require a Class III cultural resources inventory for lands subject to ground-disturbing activities. Monitoring of ground-disturbing activities would be required, and post-project monitoring may also be required, at the discretion of the BLM. Under this alternative, no direct impacts to cultural resource communities and/or sites would be allowed.

The impact of cultural resources management on fluid minerals development may be increased cost and, potentially, significant time delays for project implementation. The cost of a Class III cultural resources survey for the 18 acres of surface disturbance for this alternative is estimated to be less than \$1,000. In addition, the time necessary to obtain a favorable determination for APD approval may be longer.

Rangeland Resources Management

Under this alternative, rangeland resources management does not include any management actions that would impact fluid minerals management.

Recreation and Transportation Management

The 169 miles of roads under this alternative would service fluid minerals development in the Monument as well as recreation needs. Conflicts between mixed uses on some of these roads may occur. The two wells projected to be drilled may contribute one mile to this total. The adverse impact of transportation management under this alternative, including access restrictions, maintenance and upkeep, and installation of erosion control measures may be minor.

Solid Minerals

The goal for the solid-minerals program is to maintain the proper care and management of the objects protected by the Proclamation while, at the same time, honoring valid existing rights and mitigating any impacts from new leases, including from surface disturbance. The management objective related to this goal includes enforcing mineral resource withdrawal, as specifically stated in the Proclamation.

Except for fluid minerals leasing, the Proclamation reserved and appropriated all Federal lands and interests in lands in the Monument, and withdrew them from all forms of entry, location, selection, sale, leasing, and/or other disposition under the public land laws (including the mineral-leasing and mining laws). Thus, with the exception of fluid mineral leases, no new Federal mineral claims may be staked in the Monument, and authorization for activities on existing mineral claims would be managed by valid existing rights.

For solid minerals, no new mining claims may be located, and no new prospecting and/or exploration activities may be undertaken to identify locatable minerals and/or to establish the

discovery of valuable mineral deposits, except by existing claimants. Therefore, there would be no impacts to solid-minerals management.

4.2.15.3. Minerals Management Impact Comparison

The minerals management impact comparison is presented in Table 4-24. This table compares the consequences of resource management actions under each alternative on minerals management.

4.2.15.4. Cumulative Impacts

Alternative I would not result in new fluid mineral leases; therefore, there would be no changes in cumulative impacts from the current management situation. The cumulative impacts of drilling up to two (under Alternatives II and V) or eight (under Alternative III) new wells on currently unleased Federal and split-estate minerals, may be minor due to the fact that there are 125 existing wells in the Monument. However, the estimated fluid minerals development under Alternative IV may result in cumulative impacts. With 125 active wells currently in the Monument, up to 59 new successful wells may increase this total by 47 percent. In terms of air quality, the additional oil and natural gas wells may potentially contribute VOC emissions from wellheads and treatment facilities. In addition, particulate material may result from travel on new unpaved access roads. These additional emissions may impact air quality in the Monument and impact visibility. In terms of surface water quality, the cumulative impacts may impact offsite watersheds. The impact may result from the same water pollutants impacting onsite surface water. Scenic values may diminish across the landscape and the feeling of remote, isolated, undiscovered land may be reduced over portions of the Monument, as well as across Dolores and Montezuma Counties.

Table 4-24 Comparison of Impacts to Fluid Minerals Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Fluid Minerals	No Impact.	Make up to 880 acre available for leasing (with up to 2 successful wells drilled).	Make up to 3,021 acres available for leasing (with up to 8 successful well drilled).	Make up to 24,462 acres available for leasing (with up to 59 successful wells drilled).	Make up to 880 acres available for leasing (with up to 2 successful wells drilled).
Cultural Resources	No Impact.	Disturb no communities, sites or isolated finds (\$1,000 cost for Class III surveys).	Disturb no communities or sites (\$3,000 cost for Class III surveys).	Disturb no communities or sites (\$17,000 cost for Class III surveys).	Disturb no communities or sites (\$1,000 cost for Class III surveys).
Rangeland Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Recreation and Transportation	No Impact.	Control access. Maintain an additional 1 mile of road).	Control access. Maintain an additional 3 miles of road).	Control access. Maintain an additional 19 miles of road).	Control access. Maintain an additional 1 mile of road).
Solid Minerals	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.

4.2.16. Rangeland Resources

Rangeland resources in the Monument include livestock grazing and forage production, as described in Section 3.2.7. The primary goals for rangeland resources management are to manage livestock grazing consistent with the Public Land Health Standards and Guidelines for Livestock Grazing Management in Colorado (Public Land Health Standards), and to maintain a thriving natural ecological balance, multiple-use relationships, and productive forage resources. The management objectives related to these goals include:

- develop a rangeland monitoring strategy and plan to assess rangeland health conditions on a regular basis, as well as a process to implement necessary management revisions based on monitoring results;
- manage livestock grazing to achieve Public Land Health Standards for upland and riparian/wetland plant communities;
- manage livestock grazing to ensure the long-term sustainability of rangeland ecosystems and to promote the resistance and resilience of rangeland plants and soil to the impacts of recurring drought; and
- manage livestock grazing to meet vegetation, recreation, fish and wildlife, water quality, and cultural resource objectives and to protect sensitive or high-quality resources from adverse impacts.

Another goal of rangeland resources management is to develop and encourage public and stakeholder understanding of livestock grazing management within the Monument. The management objective related to this goal is to improve communication and understanding of range standards and expectations between the BLM, grazing permittees, and the general public.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to rangeland resources.

A number of proposed management actions have the potential to impact rangeland resources. Direct impacts to these resources are defined primarily in terms of forage production. These impacts may be adverse, resulting in disruption and/or removal of vegetation. These impacts may also be beneficial, resulting in increased forage quantity, quality, and/or availability. A number of indirect impacts to rangeland resources may also be possible as a result of proposed management actions. Indirect impacts associated with surface disturbance are assumed to occur in proportion to the relative amount of disturbance. These may include a general loss of forage area and/or availability of forage (due to surface occupancy for other uses), construction or widening of roads, direct and indirect impacts to soils and vegetation, and closure of specific areas to livestock to protect and/or enhance another resource. Vehicular traffic (including off-road vehicular traffic) and human visitors (and their dogs) may harass livestock. The introduction and/or expansion of noxious weeds through various vectors may poison livestock, replacing palatable species with unpalatable species.

Impacts to soils and/or vegetation cover may also result in the transport of eroded soils to streams and ponds, where the resulting sedimentation may reduce the availability and/or quality of watering areas. A catastrophic release of a chemical pollutant into a watering source may result in direct harm to livestock, or make watering areas unusable (such releases are infrequent, but may occur during oil and gas development and/or during chemical control of weeds).

This section discusses vegetation primarily as a resource that supports productivity requirements of livestock nutrition. However, the plants and plant communities in the Monument are also managed for their intrinsic values. Public Land Health Standards #2 and #3 acknowledge the multiple uses of the vegetation resource by discussing management along a continuum of characteristics. Managing vegetation for one aspect of the resource may result in conflicts with another aspect. For example, precluding livestock use of sensitive plant communities, such as riparian corridors, may enhance the vegetation (and associated fish and wildlife) values, but may also reduce the amount and/or quality of forage for livestock (requiring grazing permittees to provide additional sources of water).

The converse may also be true. Managing vegetation for maximum livestock productivity, palatability, and/or for nutrition often involves planting non-native forage species to supplement native species suppressed, or lost, due to prolonged grazing use. Maximizing livestock production generally means placing these large grazers into plant communities that are not resilient to the impacts of trampling and selective plant removal. Stoddart et al. (1955) acknowledge that: "It is impossible to obtain the best use of a range without some disturbance, and the rancher cannot always have climax vegetation as his goal." These conflicts are addressed throughout this analysis. Additional ramifications to vegetation are discussed in Section 4.2.8.

Vegetation is also a resource for wild herbivores, ranging in size from mice to elk. Wildlife species must compete directly with livestock for the forage and for the thermal cover this vegetation provides, as well as for space and water. Any changes in livestock and/or wild herbivore use of these resources necessarily affects the other. The result of the direct competition is generally in favor of livestock and at the expense of wildlife.

Some of the alternatives analyzed in this DRMP/DEIS incorporate management actions that skew this situation in favor of one type of herbivore over another. For example, where focused livestock use of riparian areas is allowed, the quality of the plant community as an intrinsically valuable resource and important wildlife habitat may be reduced. Likewise, increased areas of human activity may cause wildlife to avoid an area with suitable forage, leaving more of the resource available to livestock than might otherwise occur.

Other land use and resource management considerations may result in the BLM applying various stipulations and other restrictions on use to protect specific resource values. These protective stipulations and other restrictions are listed and defined in Section 2.2. Similarly, the SSR/CSU and special mitigation designations (the latter would be applied as a condition of approval of a permit) may require that a grazing permittee undertake supplemental ("non-standard") mitigation as part of a proposed action.

4.2.16.1. Evaluation Criteria and Assumptions

The most adverse direct impacts to rangeland resources result from surface disturbances; therefore, such areas are the primary parameter for discussion and comparison of impact analysis for rangeland resources. Areas reclaimed, otherwise improved, and/or protected from ground disturbance are used to describe beneficial or adverse impacts. Estimates of surface disturbance areas associated with potential management actions were calculated using data from the AMS (BLM 2005b) and from the RFD (BLM 2005c), and are summarized in Table 4-1. Proposed surface-use restrictions are listed and summarized in Table 2-1.

When quantitative analysis is not possible, categories are based upon the potential physical impacts in terms of Public Land Health Standards. For riparian/wetland vegetation, these categories are based on the potential physical impacts in terms of Public Land Health Standard

#2. For upland vegetation, these categories are based upon the potential physical impacts to this resource in terms of Land Health Standard #3.

Assumptions included in the analysis of impacts to rangeland resources include the following:

- estimated disturbance areas are distributed among upland and riparian/wetland plant communities in proportion to their relative area throughout the Monument, unless otherwise limited by applicable surface-use restrictions;
- application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E);
- Federal lands within the Monument boundary are the subject of the impact analysis; and
- the entire vicinity that comprises the Colorado Plateau Semi-desert ecoregion (Bailey 1995) is the subject of the cumulative impacts analysis

4.2.16.2. Alternative Analysis

Impacts to rangeland resources may differ in extent and severity, depending on the specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for rangeland resources, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland, and recreation and transportation.

Alternative I (No Action Alternative)

Rangeland Resources Management

Under Alternative I, 28 allotments would continue to be available for livestock grazing with up to 8,492 active AUMs permitted. Certain tracts outside of the allotments would be available for authorized livestock grazing, while others would be closed. A monitoring program would be established to determine whether or not livestock grazing goals and objectives are being achieved by the management system. Rangeland management would require improving conditions on all allotments in order to meet Public Land Health Standards. Livestock grazing use during any portion of the critical period would be limited to no more than 30 percent of the active preference, and to no more than 50 percent utilization of key forage species' current season growth. Spring use by domestic livestock in all allotments would not be permitted on native ranges during the critical period of early growth, unless a livestock grazing system is implemented that provides crucial rest periods once every three years, or unless a spring-use pasture is developed to absorb livestock grazing use in meeting the rest requirements. Existing AMPs would be revised and new ones developed, as necessary. All livestock use adjustments, including grazing systems, would be implemented through documented cooperation and consultation with the permittee.

This analysis assumes that current rangeland resource conditions and trends described in Section 3.2.7 would continue into the future under these management actions. Current rangeland evaluation and monitoring data (BLM 2001i) show that in 18 of the 28 allotments, livestock grazing is considered a contributing factor in not achieving Public Land Health Standards. Over time, this trend may continue to result in adverse impacts to rangeland resources, and in the failure to meet Public Land Health Standards in most allotments.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact rangeland resources, either directly or indirectly; therefore, continuing management would be expected to result in negligible impacts to these resources. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized, adverse impacts. The degree to which these become long-term disturbance areas would depend on the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

Fluid Minerals Management

Under Alternative I (the No Action Alternative), currently unleased acres would continue to be unavailable for new fluid minerals leases. However, development of currently leased areas would continue. Seventy-two of the 105 existing fluid mineral sites occur in 24 grazing allotments, with the majority of these in the Cross Canyon allotment. Negligible direct impacts generally occur from active mineral exploration and construction activities because livestock usually avoid these areas. Avoidance can be considered an indirect impact that results in a reduction of available forage within these allotments. Well pads, supporting access roads, as well as utility and/or pipeline corridor, may also functionally remove rangeland from forage production.

In addition to direct impacts of surface disturbance, other ongoing management actions associated with fluid minerals exploration and development have been noted as a factor in the observed downward trend in upland vegetation. This is due to incomplete or failed reclamation of closed and abandoned well pads, as well as to the associated roads and other infrastructure. Many of these sites support little vegetation, and are often dominated by noxious weeds. These areas then serve as centers of disturbance from which weeds and other undesirable plants spread into native vegetation. These factors are expected to continue to result in limited adverse impacts to rangeland resources.

Recreation and Transportation Management

Alternative I, due to the restriction on new oil and gas leases, may result in relatively low surface impacts from road development. Under this alternative, 149 miles of roads would be open to travel by a variety of means (including travel for administrative purposes and travel necessary to support existing oil and gas leases). This may result in 864 acres of surface disturbance, and in the second-lowest road density (0.58 miles/square mile) of any of the alternatives. Less ground disturbance, resulting from fewer roads may be beneficial to rangeland resources over the long-term due to the fact that it may reduce loss of forage. Opportunities for noxious weed introduction and/or infestations occurring along roadsides may be reduced in proportion to the reduction in total miles of roads.

Other Resources Management

At present, 25,549 acres of the Monument surface are managed as three WSAs under existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). Some grazing allotments coincide with these WSAs. In these areas, continued restrictions on the construction of permanent structures, facilities, and/or on surface-disturbing activities may continue to result in beneficial impacts due to the fact that forage may not be disturbed in these areas. However, livestock operators often find it easier, and more effective, to manage their livestock through the construction of such facilities. Under the No Action Alternative, should

these areas be released from WSA status, they would still be managed for wilderness characteristics; therefore, impacts may likely continue as currently exists.

Under this alternative, the 427-acre McElmo RNA would continue to be managed with special management prescriptions for research and habitat protection. Likewise, this area is protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to rangeland resources in this area.

Alternative II

Rangeland Resources Management

Alternative II would permit 6,437 active AUMs, which is considerably fewer than the 8,492 AUMs under Alternative I. Alternative II would suspend active preference of 3,706 AUMS. Suspended AUMs would be acknowledged in AMPs, but would be unavailable for livestock grazing. Twenty-three allotments (five fewer than under Alternative I) would be available for livestock grazing. Sand Canyon East, Sand Canyon West, Rock Creek, Goodman Gulch, and Trail Canyon allotments would be made unavailable to livestock grazing (see Map 3). These allotments occur in the southeastern part of the Monument and total 6,059 acres of primarily pinyon-juniper woodlands with low forage production. Closing these allotments may avoid conflicts with cultural and natural resources and recreation, and accelerate achievement of Public Land Health Standards in these areas. Reduction of AUMs throughout the remaining allotments may result in reduced pressure on existing vegetation and beneficial impacts to forage quality and quantity.

A number of specific management actions would be included in Alternative II to hasten compliance with Public Land Health standards. These would include adjusting spring livestock grazing duration and extent of use, and implementing a rotation-grazing system. Allowable utilization levels of current year growth would be no more than 30 percent of upland shrub and riparian woody species. Allowable utilization would be 35 percent of current year production for cool- and warm-season perennial grass species. In riparian systems, minimum stubble height standards for perennial grasses and forbs would be four inches in spring-use pastures and six inches in fall-and winter-use pastures. Livestock grazing within an allotment would be authorized during the critical spring growth period from March 1 through May 31 for no more than one year in any three-year period. This would be accomplished by implementing a rotational livestock grazing system and/or taking total non-use for two of every three years. Spring use would not be allowed where Public Land Health Standards are not being met. In the event a grazing permit is relinquished or becomes vacant, a determination would be made to re-issue a term grazing permit, close the allotment, or create a reserve forage allotment. Permittees and interested public would be invited to participate in monitoring. Existing AMPs would be reviewed on a regular schedule and revised, as necessary, in order to address current allotment conditions and permittee needs (in the context of achieving Public Land Health Standards and other resource management objectives). These actions may be expected to result in beneficial impacts to rangeland resources, as well as in accelerated achievement of Public Land Health Standards, when compared with the other action alternatives.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact rangeland resources, either directly or indirectly. However, to some degree, development, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would depend on the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

Under this alternative, there would be a small potential for conflict between visitors to cultural sites and livestock grazing. The areas designated as undeveloped may provide long-term benefits in that they may reduce the potential for such conflicts. The preparation of Cultural Resource Management Plans for Public Use D (Developed) cultural sites may also reduce conflict due to the fact that rangeland resources management issues would be considered in the plans.

Under Alternative II, beneficial impact to vegetation may result due to the restriction of any disturbance to cultural resource communities, sites, and/or to isolated finds. This restriction may be expected to eventually result in more numerous, larger areas in the Monument to which no direct surface disturbing impacts would be allowed. This may result in the indirect protection of forage and other rangeland resources within these areas, and may eventually provide widespread beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative II, up to 880 acres of lands currently unavailable for leasing could be leased. This may result in the development of up to two well pads; with associated roads, equaling 18 acres of long-term disturbance (see Table 4-1). Many of these may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. Rangeland disturbed by associated road, utility corridor, and/or pad construction would be rehabilitated, including with the seeding of native plant species. The development of GADPs by the BLM, and five-year development plans by the lessees, may provide long-term benefits to rangeland resource planning. The result of leasing these areas, as well as the discussed management actions under Alternative II, may result in limited adverse impacts to rangeland resources.

Recreation and Transportation Management

Alternative II, in terms of transportation management, would be the most restrictive of all of the alternatives. Under this alternative, 139 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 806 acres of surface disturbance, as well as in the lowest road density (0.54 miles/square mile) of any of the alternatives.

Less ground disturbance, resulting from fewer roads under this alternative, may be beneficial to rangeland resources over the long-term due to the fact that this may minimize the loss of forage. Opportunities for noxious weed introduction and spread along roadsides may be reduced in proportion to the reduction in the total miles of roads.

Other Resources Management

Under Alternative II, 25,549 acres of the Monument surface would continue to be managed as three WSAs under existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). Some grazing allotments coincide with these WSAs. In these areas, continued restrictions on the construction of permanent structures, facilities, and/or on surface-disturbing activities may continue to result in beneficial impacts due to the fact that forage may not be disturbed in these areas. However, livestock operators often find it easier, and more effective, to manage their livestock through the construction of such facilities.

Similar to all of the action alternatives, these areas would also be designated as a NGD/NSO. Therefore, should these areas be released from WSA status, they would still be protected from long-term surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives also include additional management actions

intended to protect and enhance the wilderness characteristics of the WSAs. All of these actions may result in protection of livestock forage and rangeland resources.

Under Alternative II, the existing McElmo RNA would be considerably expanded (from 427 to 7,826 acres), and would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, portions of this area would be protected from surface disturbance associated with oil and gas development by an NGD/NSO. This management may result in beneficial impacts to rangeland resources in this area.

Alternative II would also include management of 25 miles of river reaches as suitable for WSR designation. This may result in beneficial impacts to rangeland resources throughout these reaches because protecting riparian vegetation is key to maintaining the WSR status.

Alternative III

Rangeland Resources Management

Under Alternative III, active AUMs would be 124 fewer than those proposed under Alternative I (8,368 versus 8,492, respectively) based on closing five allotments. Alternative III would also suspend active preference of 3,706 AUMS, identified in all affected grazing permits. Suspended AUMs would be acknowledged in AMPs, but would be unavailable for livestock grazing.

Twenty-three allotments (five fewer than under Alternative I) would be available for livestock grazing. Sand Canyon East, Sand Canyon West, Rock Creek, Goodman Gulch, and Trail Canyon allotments would be made unavailable to livestock grazing (see Map 3). This would account for the 124 fewer AUMs under this alternative. These allotments occur in the southeastern part of the Monument and total 6,059 acres of primarily pinyon-juniper woodlands with low forage production. Closing these allotments may result in the avoidance of conflicts between cultural and natural resources and recreation, and accelerate achievement of Public Land Health Standards in these areas. However, as the open allotments would not experience any reduction in AUMs, this aspect of rangeland management under Alternative III is not expected to result in substantial overall improvements to current rangeland resource conditions and trends; trends that show livestock grazing is not achieving Public Land Health Standards.

Alternative III would consist of a number of other specific rangeland management actions that are not included in Alternative I, although several are less stringent than under Alternative II. Spring livestock grazing duration and extent of use would be limited, and a rotation-grazing system would be implemented. The allowable utilization level of current year growth would be no more than 30 percent of upland shrub and riparian woody species. In riparian areas, minimum stubble height standards for perennial grasses and forbs would be four inches in spring-use pastures and six inches in fall- and winter-use pastures. Allowable utilization would be 50 percent of current year production for desired cool- and warm-season perennial grass species where Public Land Health Standards are being met, and 35 percent where the standards for soil and plant communities are not being met. If utilization or stubble height standards are not achieved, annual adjustments in reduced livestock numbers and/or season of use would be made. Livestock grazing within an allotment would be authorized during the critical spring growth period from March 1 through May 31 for no more than two years in any three-year period. This would be accomplished by implementing a rotational livestock grazing system or by taking total non-use every third year. More stringent spring deferment (two years out of every three) could be implemented, or spring use would not be allowed, where Public Land Health Standards are not being met. In the event a grazing permit is relinquished or becomes vacant, a determination would be made to re-issue a term grazing permit, close the allotment, or create a reserve forage allotment. Permittees and interested public would be invited to participate in Public Land Health monitoring. Existing AMPs would be revised, as

necessary, to facilitate the obtainment of the Public Land Health Standards. New AMPs would be developed, as necessary. These actions may result in beneficial impacts and may help movement toward achieving Public Land Health Standards; however, it would likely be at a slower pace than under Alternatives II and V.

Cultural Resources Management

Under this alternative, few cultural resources management would actions impact rangeland resources, either directly or indirectly. However, to some degree, development, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would depend on the care that is originally taken to minimize vegetation disturbance, as well as the degree to which appropriate reclamation techniques are implemented.

Under this alternative, there is a small potential for conflict between visitors to cultural sites and livestock grazing. The areas designated as undeveloped may provide long-term benefits due to the fact that they may reduce the potential for such conflicts. The preparation of Cultural Resource Management Plans for Public Use D (Developed) cultural sites may also reduce conflict due to the fact that rangeland resources management issues would be considered in the plans.

Under Alternative III, some beneficial impact to rangeland resources may result due to the restriction of any direct impacts to cultural resource communities and/or to sites. This restriction may eventually result in more numerous, larger areas in the Monument to which no direct impacts would be allowed. This may result in the indirect protection of the rangeland resources within these areas, and may eventually provide beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres of land currently unavailable for leasing could be leased. This may result in the development of up to eight new well pads; with the associated roads, equaling 73 acres of long-term disturbance (see Table 4-1). The result of leasing these areas under Alternative III may be considerably more direct adverse impacts to rangeland than those expected under Alternatives I, II and V, but less than those expected under Alternative IV.

Under this alternative, some of these impacts may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. Rangeland disturbed by road, utility corridor, and/or pad construction would be rehabilitated, including with the seeding of native plant species, or non-native species, where considered necessary. The development of GADPs by the BLM, and five-year development plans by the lessees, may provide long-term benefit to rangeland resource planning.

Recreation and Transportation Management

Alternative III, in terms of transportation management, would be the second least restrictive of all of the alternatives. Under this alternative, 89 miles of roads would be open to all forms of travel (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 1,096 acres of surface disturbance, as well as in the second highest road density (0.73 miles/square mile) of any of the alternatives.

These factors may contribute to adverse impacts to rangeland resources due to the fact that more ground may be disturbed and that more forage may be removed. Relatively few existing roads would be returned to native vegetation through reclamation. Indirectly, opportunities for noxious weed introduction and/or spread may increase in proportion to the increased numbers of roads.

Other Resources Management

Under Alternative III, 25,549 acres of the Monument surface would continue to be managed as three WSAs under existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). Some grazing allotments coincide with these WSAs. In these areas, continued restrictions on the construction of permanent structures, facilities, and/or on surface-disturbing activities may continue to result in beneficial impacts because forage may not be disturbed in these areas. However, livestock operators often find it easier, and more effective, to manage their livestock through the construction of such facilities.

Similar to all of the action alternatives, these areas would also be designated as a NGD/NSO. Therefore, should these areas be released from WSA status, they would be protected from surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives include management actions intended to protect and enhance the wilderness characteristics of the WSA areas. These actions may result in greater beneficial impacts to rangeland resources than those expected under Alternative I.

Under this alternative, the 427-acre McElmo RNA would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, this area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to rangeland resources in this area.

Alternative IV***Rangeland Resources Management***

Grazing administration allocations would be the same under Alternative IV as under Alternative I (the No Action Alternative). Twenty-eight allotments would continue to be available for livestock grazing, with 8,492 active AUMs on a total of 165,000 acres (see Map 3). Alternative IV would also suspend active preference of 1,692 AUMS, identified in all affected grazing permits. Suspended AUMs would be acknowledged in AMPs, but would be unavailable for livestock grazing.

This analysis assumes that current rangeland resource conditions and trends described in Section 3.2.7 would continue into the future under these management actions. Current rangeland evaluation and monitoring data (BLM 2001i) show that in 18 of the 28 allotments, livestock grazing is contributing to allotments not achieving Public Land Health Standards. Over time, this trend may continue to result in adverse impacts to rangeland resources, and in failure to meet Public Land Health Standards in most allotments.

Alternative IV does, however, consist of a number of other specific rangeland management actions that are not included under Alternative I. Adjustments to spring livestock grazing duration and extent of use, and implementation of a rotation-grazing system, would be applied. The allowable utilization level of current year growth would be no more than 30 percent of the upland shrub and riparian woody species. In riparian systems, minimum stubble height standards for perennial grasses and forbs would be four inches in spring-use pastures and six inches in fall- and winter-use pastures. Allowable utilization would be 50 percent of current year production for desired cool- and warm-season perennial grass species. If utilization or stubble height standards are not achieved, annual adjustments in reduced livestock numbers or season of use would be made. Livestock grazing within an allotment would be authorized during the critical spring growth period from March 1 through May 31 for no more than two years in any three-year period. This would be accomplished by implementing a rotational grazing system or taking total non-use every third year. More stringent spring deferment (two years out of three) may be implemented or spring use would not be allowed where Public Land Health Standards

are not being met. In the event a grazing permit is relinquished or becomes vacant, a determination would be made to re-issue a term grazing permit, close the allotment, or create a reserve forage allotment. Permittees and interested public would be invited to participate in Public Land Health monitoring. Existing AMPs would be revised, as necessary, to facilitate the obtainment of the Public Land Health Standards. New AMPs would be developed, as necessary. Although these actions may contribute to gradual improvement to some rangeland resources (when combined by the number of active AUMs and allotments), if these improvements occur, it may be at a considerably slower pace than under Alternatives II and V.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact rangeland resources, either directly or indirectly. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would depend on the care that is originally taken to minimize vegetation disturbance, as well as on the degree to which appropriate reclamation techniques are implemented.

There is a small potential for conflict between visitors to cultural sites and livestock grazing. The areas designated as undeveloped may provide long-term benefits due to the fact that they may reduce the potential for such conflicts. The preparation of Cultural Resource Management Plans for Public Use D (Developed) cultural sites may also reduce conflict due to the fact that rangeland resources management issues would be considered in the plans.

Under Alternative IV, some beneficial impact to rangeland resources may result due to the restriction of any direct impacts to cultural resource communities and/or to sites. This restriction may eventually result in more numerous, larger areas in the Monument to which no direct impacts would be allowed. This may result in the indirect protection of the rangeland resources within these areas, and may eventually provide beneficial impacts to these resources.

Fluid Minerals Management

Under Alternative IV, a notably larger number of acres (up to 24,462) of lands currently unavailable for leasing could be leased. This may result in up to 59 well pads being developed, with associated roads equaling 447 acres of long-term disturbance. Some of these impacts may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. Rangeland disturbed by associated roads, utility corridors, and/or pad construction would be rehabilitated, including with the seeding of both native and non-native plant species. The development of GADPs by the BLM, and 5-year development plans by the lessees, may provide some long-term benefit to rangeland resource planning. However, overall, considerable adverse impacts to rangeland resources may be expected from fluid minerals management under Alternative IV.

Recreation and Transportation Management

Alternative IV, in terms of transportation management, would be the least restrictive of all of the alternatives. Under this alternative, 213 miles of roads would be open to all forms of travel (including travel for administrative and travel necessary to support new and existing oil and gas leases). This may result in 1,235 acres of surface disturbance, as well as in the highest road density (0.83 miles/square mile) of any of the alternatives.

These factors may contribute to adverse direct impacts to all rangeland resources over the long-term, due to the increased fragmentation of habitat and to the chances of disturbance impacts to special status plant species and/or to significant plant communities. Opportunities for noxious

weed introductions and/or spread may increase in proportion to the increased numbers of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative IV, 25,549 acres of the Monument surface would continue to be managed as three WSAs under existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). Some grazing allotments coincide with these WSAs. In these areas, continued restrictions on the construction of permanent structures, facilities, and/or on surface-disturbing activities may continue to result in beneficial impacts due to the fact that forage may not be disturbed in these areas. However, livestock operators often find it easier, and more effective, to manage their livestock through the construction of such facilities.

Similar to all of the action alternatives, these areas would also be designated as a NGD/NSO. Therefore, should these areas be released from WSA status, they would be protected from long-term surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives include additional management actions intended to protect and enhance the wilderness characteristics of the WSA areas. All of these actions may result in protection of livestock forage and rangeland resources.

Under this alternative, the 427-acre McElmo RNA would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, this area would be protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to rangeland resources in this area.

Alternative V (Preferred Alternative)

Rangeland Resources Management

Similar to Alternative II, the Preferred Alternative would include 6,437 active AUMs, which would be considerably fewer than those proposed under Alternative I (8,492 AUMs). Alternative V would suspend active preference of 3,706 AUMS, identified in all affected grazing permits. Suspended AUMs would be acknowledged in AMPs, but would be unavailable for livestock grazing. Twenty-three allotments (five fewer than under Alternative I) would be available for livestock grazing. Sand Canyon East, Sand Canyon West, Rock Creek, Goodman Gulch, and Trail Canyon allotments would be made unavailable to livestock grazing (see Map 3). These allotments occur in the southeastern part of the Monument and total 6,059 acres of primarily pinyon-juniper woodlands with low forage production. Closing these allotments may avoid conflicts with cultural and natural resources and recreation, and accelerate achievement of Public Land Health Standards in these areas. Reduction of AUMs throughout the remaining allotments may result in reduced pressure on existing vegetation and in expected beneficial impacts to forage quality and quantity.

A number of specific management actions are included in Alternative V to hasten compliance with Public Land Health standards. These would include adjusting spring livestock grazing duration and extent of use, and implementing a rotation-grazing system. Allowable utilization levels of current year growth would be no more than 30 percent of upland shrub and riparian woody species. Utilization would be 35 percent of current year production for cool- and warm-season perennial grass species. In riparian systems, minimum stubble height standards for perennial grasses and forbs would be four inches in spring-use pasture and six inches in fall- and winter-use pastures. Livestock grazing within an allotment would be authorized during the critical spring growth period from March 1 through May 31 for no more than one year in any three-year period. This would be accomplished by implementing a rotational livestock grazing system or taking total non-use for two of every three years. Spring use would not be allowed

where Public Land Health Standards are not being met. In the event a grazing permit is relinquished or becomes vacant, a determination would be made to re-issue a term grazing permit, close the allotment, or create a reserve forage allotment. Permittees and interested public would be invited to participate in monitoring. Existing AMPs would be reviewed on a regular schedule and revised, as necessary, in order to address current allotment conditions and permittee needs in the context of achieving Public Land Health Standards and other resource management objectives. These actions may be expected to result in beneficial impacts to rangeland resources, as well as in accelerated achievement of Land Health Standards, in comparison to the other action alternatives.

Cultural Resources Management

Under this alternative, few cultural resources management actions would impact rangeland resources, either directly or indirectly. However, to some degree, development and stabilization, testing, and/or other activities that result in surface clearance of vegetation may result in highly localized adverse impacts. The degree to which these become long-term disturbance areas would depend on the care that is originally taken to minimize vegetation disturbance, as well as in the degree to which appropriate reclamation techniques are implemented.

There is a small potential for conflict between visitors to cultural sites and livestock grazing. The areas designated as undeveloped may provide long-term benefits due to the fact that they may reduce the potential for such conflicts. The preparation of Cultural Resource Management Plans for Public Use D (Developed) cultural sites may also reduce conflict due to the fact that rangeland resources management issues would be considered in the plans.

Under Alternative V, some beneficial impact to rangeland resources may result due to the restriction of any direct impacts to cultural resource communities and/or to sites. This restriction may eventually result in more numerous, larger areas in the Monument to which no direct impacts would be allowed. This may result in the indirect protection of the rangeland resources within these areas, and may eventually provide beneficial impacts to these resources.

Fluid Minerals Management

Similar to Alternative II, under the Preferred Alternative, up to 880 acres of lands currently unavailable for leasing could be leased. This may result in the development of up to two well pads, with associated roads equaling up to 12 acres of long-term disturbance (see Table 4-1). Many of these may be mitigated by the application of appropriate BMPs and standardized reclamation practices, such as COAs on the new leases. Rangeland disturbed from road, utility corridor, and/or pad construction would be rehabilitated, including with the seeding of native plant species. The development of GADPs by the BLM, and 5-year development plans by the lessees, may provide a small long-term benefit to rangeland resource planning. The result of leasing these areas, as well as the discussed management actions under Alternative V, may result in limited adverse impacts to rangeland resources.

Recreation and Transportation Management

Alternative V, in terms of transportation management, would fall in the middle of all alternatives. Under this alternative, 169 miles of roads would be open to all forms of s (including travel for administrative purposes and travel necessary to support new and existing oil and gas leases). This may result in 980 acres of surface disturbance, as well as in a road density of 0.66 mile/square mile.

These factors may result in adverse impacts to all rangeland resources over the long-term due to the loss of forage, the increased fragmentation of habitat, and the increased chances of

disturbance to special status plant species and/or to significant plant communities. Opportunities for noxious weed introduction and spread may increase in proportion to the increased numbers of roads (Harris and Silvea-Lopez 1992, Zink et al. 1995).

Other Resources Management

Under Alternative V, 25,549 acres of the Monument surface would continue to be managed as three WSAs under existing non-impairment standards and practices, in accordance with Interim Management Policy, until they are designated as wilderness or until they are released by Congress (BLM 1995). Some grazing allotments coincide with these WSAs. In these areas, continued restrictions on the construction of permanent structures, facilities, and/or on surface-disturbing activities may continue to result in beneficial impacts due to the fact that forage may not be disturbed in these areas. However, livestock operators often find it easier, and more effective, to manage their livestock through the construction of such facilities.

Similar to all of the action alternatives, these areas would also be designated as a NGD/NSO. Therefore, should these areas be released from WSA status, they would be protected from long-term surface-disturbing activities because they would still be managed for wilderness characteristics. All of the action alternatives include additional management actions intended to protect and enhance the wilderness characteristics of the WSA areas. All of these actions may result in protection of livestock forage and rangeland resources.

The existing McElmo RNA would be considerably expanded under Alternative V (from 427 to 7,826 acres), and would continue to be managed with special management prescriptions for herpetological research and habitat protection. Likewise, portions of this area are protected from surface disturbance associated with oil and gas development by an NSO. This management may result in beneficial impacts to rangeland resources in this area.

Alternative V would also include the management of 25 miles of river reaches as suitable for WSR designation. This may result in beneficial impacts to rangeland resources throughout these reaches, due to the fact that protecting riparian vegetation is key to maintaining the WSR status.

4.2.16.3. Rangeland Resources Management Impact Comparison

The rangeland resources impact comparison is presented in Table 4-25. This table compares the consequences of resource management actions under each alternative on rangeland resources.

4.2.16.4. Cumulative Impacts

Cumulative impacts are discussed in terms of: 1) past, present, and future actions in non-BLM portions of the Monument and the surrounding region; 2) the impacts resulting from ongoing actions on BLM lands, not included this DRMP/DEIS; and 3) the additive and synergistic effects of multiple management actions on rangeland resources. For this discussion, the region is considered the areas immediately adjacent to the Monument, as well as the entire vicinity that comprises Dolores and Montezuma Counties.

Livestock grazing has occurred in the Monument, as well as throughout the general vicinity, for decades. The general condition of the range throughout this area is poor. This is due to overlapping use by livestock and wild herbivores, the general unsuitability of this ecoregion's plant communities to support extensive and long-term domestic herbivore grazing, and to the regional drought. All of the potential adverse impacts discussed as consequences of different alternatives are cumulative to prior degradation of rangeland resources. Therefore, adverse

impacts that may result from management actions under this DRMP/DEIS may have the potential to be cumulatively greater than when assessed in isolation.

Regardless of management actions in the Monument, direct adverse impacts to rangeland resources may result from ongoing human development throughout the general region, which may bring new roads, fluid minerals development, housing, commercial development, and/or increasing recreational use of rangeland.

Under the No Action Alternative, the currently unleased acres would continue to be unavailable for new fluid minerals leases. However, continued development of areas currently leased is expected to result in up to 121 new well pads over the next 20 years, with up to an associated eight new treatment facilities, 53 miles of pipeline, and 67 miles of roads. The expected commensurate surface disturbance from these developments is expected to total up to 883 acres of short-term disturbance or up to 428 acres of long-term impacts to rangeland resources, after reclamation of abandoned and non-productive well pads.

Future development of fluid minerals on currently leased and private surface lands within the Monument, as well as on adjacent areas, may result in impacts similar to those from development on the BLM portions. These cumulative impacts may be greater if reclamation of short- and long-term disturbances and avoidance of riparian areas are not performed to any standards. Reclamation on private lands is negotiated between the landowner and oil and gas operator and may, therefore, be less stringent in terms of plant species composition, cover, and/or structure. Failure to perform adequate reclamation and/or to avoid riparian/wetland areas may result in indirect impacts to BLM lands due to the fact that this may create a seed source for noxious weed infestations and/or contribute to sedimentation in riparian areas. Degradation of these areas may also result in a decrease in the areal extent of vegetation communities and/or in the quality of wildlife habitat and human recreation experience throughout the area.

Table 4-25 Comparison of Impacts to Rangeland Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Rangeland Resources	Permit 8,492 active AUMs. Manage 28 allotments. Not meeting Land Health Standards.	Permit 6,437 active AUMs. Manage 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health Standards.	Permit 8,368 active AUMs. Manage 23 allotments. Take specific actions to progress toward meeting Public Land Health Standards.	Permit 8,492 active AUMs. Manage 28 allotments. Take specific actions to progress toward meeting Public Land Health Standards.	Permit 6,437 active AUMs. Manage 23 allotments. Take specific actions to rapidly progress toward meeting Public Land Health Standards.
Cultural Resources	Protect cultural sites.	Protect cultural communities, sites, and isolated finds.	Protect cultural communities and sites.	Protect cultural communities and sites.	Protect cultural communities and sites.
Fluid Minerals	No Impact.	Make up to 880 acres available for new leases. Allow up to 2 new well pads (with up to 18 acres of disturbance).	Make up to 3,021 acres available for new leases. Allow up to 8 new well pads (with up to 73 acres of disturbance).	Make up to 24,462 acres available for new leases. Allow up to 59 new well pads (with up to 447 acres of disturbance).	Make up to 880 acres available for new leases. Allow up to 2 new well pads (with up to 18 acres of disturbance).
Recreation and Transportation	Manage 149 miles road miles (with 864 acres of disturbance); 0.58 miles per square mile road density.	Manage 139 miles road miles (with 806 acres of disturbance); 0.54 miles per square mile road density.	Manage 189 miles road miles (with 1,096 acres of disturbance); 0.73 miles per square mile road density.	Manage 213 miles road miles (with 1,235 acres of disturbance); 0.83 miles per square mile road density.	Manage 169 miles road miles (with 980 acres of disturbance); 0.66 miles per square mile road density.
Other Resources:	Manage 25,549 acres	Manage 25,549 acres	Manage 25,549 acres	Manage 25,549 acres	Manage 25,549 acres

Table 4-25 Comparison of Impacts to Rangeland Resources					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Special Designations	as WSA. Manage 427 acres as RNA. Manage 0 acres as WSR.	as WSA. Manage 5,223 acres for Wilderness Character. Manage 7,826 acres as RNA. Manage 25.3 miles as WSR (suitable).	as WSA. Manage 427 acres as RNA. Manage 0 acres as WSR.	as WSA. Manage 427 acres as RNA. Manage 0 acres as WSR.	as WSA. Manage 5,223 for Wilderness Character. Manage 7,826 acres as RNA. Manage 0 acres as WSR.

4.2.17. Recreation

The primary goal for recreation is to manage and enable access to the Monument for recreational activities while, at the same time, protecting cultural and natural resources, ensuring compatibility with other existing and permitted uses, and considering impacts on adjacent landowners and the local community. The management goals include:

- produce Recreation Management Objectives for specific recreation opportunities, consisting of activities, experiences, and benefits;
- sustain Recreation Setting Prescriptions to produce targeted recreation opportunities and to facilitate the attainment of experiences and benefits; and
- use Providers' Implementing Actions to conduct, yet constrain, all management, marketing, monitoring, and administrative support actions, as necessary to produce targeted recreation opportunities, facilitate outcome attainment, and sustain prescribed recreation setting character.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to recreation management.

Recreational activities offered throughout the Monument include, but are not limited to, wildlife viewing, scenic drives, hunting, camping, hiking, mountain biking, horseback riding, sports climbing, OHV use, accessing a number of Ancestral Puebloan culture sites, and experiencing the scenic vistas of Colorado Plateau geology and ecology. Determining adverse or beneficial impacts to recreational resources is often difficult. One person may perceive an action to be adverse; another person may perceive it to be beneficial. For example, certain management actions may promote a backcountry recreation experience, while other management actions promote a frontcountry recreation experience.

Direct impacts to recreation may include road closures or openings, changes to methods of travel, and/or entrance fees. Indirect impacts may include the presence of livestock in a recreation area, the sight of mineral wells, and/or water diversion.

4.2.17.1. Evaluation Criteria and Assumptions

Impact analysis from recreation management actions and to recreation uses is difficult. However, differences between the alternatives in terms of experiences being offered can be evaluated. For example, Alternative IV would provide a more developed experience with numerous travel roads, facilities, and visitors. Alternatives II and V, on the other hand, would provide greater opportunities for backcountry travel, offering more solitude, fewer roads, and fewer facilities.

Assumptions used in analyzing impacts to recreation include the following:

- Application of appropriate BMPs and standardized reclamation practices would be required as COAs for all new leases, permits, and surface disturbance areas (see Appendix E).
- This impact analysis considers the spatial boundary as the existing limits of recreational lands and facilities within the Monument, and the temporal boundary as the 20-year planning horizon.
- Cumulative impacts are considered at the regional scale and, more specifically, for Dolores and Montezuma Counties.

4.2.17.2. Alternative Analysis

Impacts to recreation may differ in extent and severity, depending on the specific management actions under each alternative for different resource uses. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for recreation, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and travel management.

Alternative I (No Action Alternative)

Recreation Management

Under the No Action Alternative, impacts to recreation resources would not change from current conditions. This alternative would continue to ensure that recreational sites at Lowry, Painted Hand, and Sand Canyon Pueblos are maintained. A broad range of recreation settings and activities would be maintained, while preventing and/or reducing resource degradation caused by recreation use, and while providing for visitor health and safety. Recreation opportunities would continue to be evaluated on a case-by-case basis as a part of project-level planning. The BLM would provide for a blend of settings and opportunities. Local communities would provide facility-dependent settings and opportunities. Visitor services and facility requirements would be managed to meet recreation goals. This alternative would continue to manage recreation based on “emphasis areas” (whereas one area may emphasize wildlife habitat, another may emphasize livestock grazing, and yet another may emphasize recreation). Existing limitations and closures would be retained. Based on the Proclamation, no motorized and no mechanized cross-country travel would be allowed. No new commercial SRPs would be issued.

Cultural Resources Management

Under Alternative I, cultural resources would continue to be developed for visitation and for interpretation. Areas would be made available for day use, where feasible, with the development of infrastructure to support visitors, where needed. As a result, there would be no change in the impacts to recreational use under this alternative.

Fluid Minerals Management

Under this alternative, no new fluid mineral leases would be available (although existing leases would not be affected). Site-specific visual quality objectives and design guidelines for infrastructure development would continue to be implemented. Therefore, there would be no impacts from this management.

Rangeland Resources Management

Under this alternative, rangeland resources management would be based on 8,492 active AUMs and 28 allotments. There would be no new management actions under this alternative, which may mean that poor Public Land Health would likely continue (but without significant impacts on recreation management).

Transportation Management

This alternative would maintain the current 149 miles of roads within the Monument. No separation of roads between bike, foot, and/or horse would occur, and conflicts between recreation users may continue in the Sand Canyon/East Rock Creek area. All motorized and mechanized travel would be restricted to designated roads. A total of 131 miles of roads would be designated open to all forms of travel. Seven transportation facilities would be included under this alternative. This management may have beneficial impacts on recreation due to the fact that visitors would be able to access recreational opportunities.

Other Resources Management

Spectacular scenery is one of the primary reasons people come to the Monument to recreate. Therefore, to protect this resource, visual quality would be actively managed. Visual quality is measured on a scale from Class I (most pristine) to Class V (most altered). Based on Interim Guidance, WSAs are to be managed as Class I. For this alternative, 25,976 acres would be managed according to Class I; 139,265 acres would be managed according to Class II; and 94 acres would be managed according to Class III. This alternative would continue to manage visual resources according to interim management, which states, “permanent or long-term visual intrusions would be discouraged” and “Preserve scenic values enhance viewing opportunities and increase variety where appropriate” (BLM 1985).

Alternative II***Recreation Management***

This alternative defines the Monument in terms of RMZs. Each zone would be managed in terms of its defined objectives and setting. Under this alternative, the BLM would provide for day-use visitation to the Monument, as well as for recreational opportunities that include such activities as hiking, biking, horseback riding, OHV use, driving, and/or viewing of archeological resources. Yet, given the restrictions on travel and the lack of facilities, this alternative may largely promote an undeveloped character in the Monument.

Under this alternative, there would be an overall reduction of total road miles available for travel through the Monument, which may promote a backcountry setting for most recreation activities. Because the number of available roads throughout the Monument would be reduced and reclaimed under this alternative, motorized visitors would be concentrated in a few developed locations. The Monument would charge visitors an entrance fee for developed sites, including for the Sand Canyon/Rock Creek management area, as well as for Lowry, Painted Hand, and Sand Canyon Pueblo sites. This may likely reduce recreation usage of these areas.

Visitation would focus on incidental visitors and local residents. Camping, campfires, recreational shooting, geocaching, and climbing would be prohibited throughout the Monument. No new construction of parking areas would occur, and the construction of facilities and/or of infrastructure would be discouraged. Although this alternative would require less funding to maintain its few structures, it may be unlikely to keep up with the increasing demand for recreation on public lands. This alternative would manage almost solely for day-use visitors seeking quiet and solitude through backcountry experiences. A total of 8,211 acres would be managed for public visitation, and 157,124 acres would be managed for backcountry use. No new SRPs and no renewal of existing SRPs would be allowed. Because most of the Monument would not be accessible, and overnight camping would be prohibited, much of the Monument may receive little to no recreational use.

Cultural Resources Management

Under Alternative II, the Monument would be promoted as an outdoor museum, allowing visitors to experience cultural and natural resources in their natural undisturbed landscape through self-discovery. In addition, 13 cultural sites would be developed for public visitation. This would provide specific areas to which the public is directed, would facilitate visitation on developed roads, and would provide interpretive signs and education. The development of these cultural resource sites may enhance frontcountry visitor experiences.

Fluid Minerals Management

Under this alternative, up to 880 acres would become available for new mineral leases. Protective measures in leased areas would include the consolidation of maintenance activities

to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Leases would stipulate that access be limited to one road for many of the energy developments. No increase in infrastructure development in new lease areas would occur along the Byway. A total of up to 18 acres of ground would be disturbed because of this alternative. Given the required stipulations, adverse impacts to recreation may be minimal.

Rangeland Resources Management

Under Alternative II, rangeland resources would be managed to reduce conflicts between livestock grazing, recreating publics, and the protection of cultural resources. There would be a reduction of 2,055 active AUMs (from 8,492 to 6,437). Of primary benefit to recreational activities may be the closing of five livestock allotments to grazing (which are located in an area popular to hikers, mountain bike riders, and horseback riders, (i.e., Sand Canyon/East Rock). The removal of livestock from this area may provide beneficial impacts because of rangeland resources management, and may eliminate conflicts of use on trails.

Transportation Management

This alternative would propose 139 miles of roads within the Monument. No separation of roads between bike, foot, and/or horse would occur, and some conflicts between recreation users may continue to occur in the Sand Canyon/East Rock Creek area. A total of 50 miles of roads would be designated open to all forms of travel. All existing user-created roads would be closed. All motorized and mechanized travel would be restricted to designated roads. This decrease in available roads may discourage the public from exploring more of the Monument.

Other Resources Management

Spectacular scenery is one of the primary reasons people come to the Monument to recreate. Therefore, to protect this resource, visual quality would be managed. Visual quality is measured on a scale from Class I (most pristine) to Class V (most altered). This alternative would manage 28,598 acres as Class I; 126,643 as Class II; and 94 acres as Class III.

Alternative III

Recreation Management

This alternative manages for a mix of backcountry and frontcountry opportunities. Under this alternative, there would be an overall increase of total road miles available to travel through the Monument, which may potentially increase recreational resource usage. However, the number of public roads available throughout the Monument would be reduced and reclaimed, which may potentially deter visitors from using more remote sections of the Monument (concentrating them in areas with roads).

This alternative defines the Monument in terms of RMZs. Each zone would be managed in terms of its defined objectives and setting. Under this alternative, the BLM would provide destination points for local and regional visitors, and would actively market the area as a tourism opportunity for people in the Four Corners area. This may require the construction of some facilities and infrastructure, which may result in a greater reliance on collaboration with counties for funding and/or for work and materials.

Under this alternative, there would be an overall reduction from current levels of total road miles available to travel. The transportation system would allow for a mix of uses; however, this alternative would attempt to segregate possible conflicting uses by establishing separate trails for foot/bike and for foot/horse. The Monument would charge visitors an entrance fee for the AHC only.

Recreational shooting, geocaching, and climbing would be prohibited. Camping and campfires would be prohibited in the Pueblo Sites, Sand Canyon/Rock Creek, and AHC Recreation Management areas, but would be allowed elsewhere. Parking areas may be established to accommodate up to 10 vehicles.

In summary, approximately 18,875 acres would be managed for public visitation, and 146,460 acres would be managed for backcountry use. Existing SRPs would be allowed to continue and could be renewed. New permits would not be issued. The transportation system would consist of 189 miles of roads.

Cultural Resources Management

Under Alternative III, the Monument would be promoted as an outdoor museum, allowing visitors to experience cultural and natural resources in their natural undisturbed landscape through self-discovery. In addition, 13 to 25 cultural sites would be developed and interpreted for the public. This would direct visitors to specific public roads for hiking and viewing developed portions of the Monument. Cultural resources management may be beneficial to recreation.

Fluid Minerals Management

Under Alternative III, there would be up to 3,021 acres available for new leases. Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits in any existing lease areas. Leases would stipulate that access be limited to one road for all energy developments. This increase in acreage available for leasing may lead to an increase in infrastructure development in areas currently used for recreational activities (which may be visually distracting to visitors), or may eliminate roads and/or areas currently used by recreationists. This alternative would result in up to 73 acres of ground disturbance. Required stipulations may minimize adverse impacts to recreation.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to reduce conflicts between livestock grazing and the protection of cultural resources. Under this alternative, there would be a minor reduction of active AUMS (from 8,492 AUMs under Alternative I to 8,368 under this alternative). These AUMs would be accounted for by closing the five allotments in the Sand Canyon/Rock Creek area. The removal of livestock from this area may eliminate further livestock impacts to cultural resources and may eliminate conflicts of use on trails. Conflicts between recreational activities and livestock elsewhere in the Monument may continue at the same level.

Transportation Management

This alternative would allow 189 miles of roads within the Monument. Segregation of road uses would be incorporated into this alternative to reduce conflicts between bike, foot, and horse travel, as well as between motorized and non-motorized travel. A total of 60 miles of roads would be designated open to all forms of travel. All motorized and mechanized travel would be restricted to designated roads. Alternative III would promote low-impact activity, and would add a few more destination facilities than proposed under Alternative II (13 facilities) to support the transportation system.

Other Resources Management

Spectacular scenery is one of the primary reasons people come to the Monument to recreate. Therefore, in order to protect this resource, visual quality would be managed. Visual quality is measured on a scale from Class I (most pristine) to Class V (most altered). This alternative

would manage 25,976 acres as Class I; 34,754 as Class II; and 104,605 acres as Class III. Alternative III visual resource management may not be as beneficial as management proposed under Alternatives I and II.

Alternative IV

Recreation Management

This alternative defines the Monument in terms of RMZs. Each zone would be managed in terms of its defined objectives and setting. This alternative would manage for a mix of backcountry and frontcountry opportunities, with a greater emphasis on larger developed areas. This alternative would promote a destination management strategy, marketing tourism for national and international visitors. This marketing strategy may require greater coordination among county and Federal entities to meet facility and infrastructure demands. Management actions would continue to provide multiple-use opportunities in the Monument, while emphasizing cultural resource values.

Under this alternative, management plans for recreation would restrict certain activities (i.e., target shooting and climbing) in various SRMAs in the Monument. Camping and campfires would be allowed in designated areas in the more developed recreation management zones. Dispersed camping and campfires would be allowed in less developed recreation management zones. Additional roads would be designated, including a variety of transportation methods in order to allow users to explore and utilize more of the Monument than is currently available.

In summary, approximately 47,056 acres would be managed for public visitation, and 118,279 acres would be managed for backcountry use. New SRPs would be allowed on a case-by-case basis. The transportation system would consist of a total of 213 miles of roads.

Cultural Resources Management

Under Alternative IV, the Monument would be promoted as an outdoor museum, allowing visitors to experience the natural and cultural resources through self-discovery. In addition, 13 to 25 cultural sites would be developed for public interpretation. This may be a beneficial impact, due to the fact that it would direct visitors to specific public roads for hiking and viewing in more developed portions of the Monument.

Fluid Minerals Management

Under Alternative IV, there would be up to 24,462 acres available for new leases. Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Leases would stipulate that access be limited to one road for all energy developments. This increase in acreage available for leasing may lead to an increase in infrastructure development near recreational areas, which may be visually distracting to visitors using these areas. Development of these lease areas may increase road usage by commercial vehicles accessing these areas. As a result, both noise and visual impacts to recreating publics may result. This alternative would result in up to 447 acres of ground disturbance. Required stipulations may help to minimize adverse impacts to recreation.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve land health, yet, to a lesser level and at a slower rate than under Alternatives II and V. Although active AUMs would remain at the current level, additional restrictions on livestock management would be implemented. No livestock grazing allotments would be closed, which may mean that conflicts

between livestock grazing and recreating publics in the Sand Canyon/East Rock area would continue. This alternative may be the least beneficial to recreation.

Transportation Management

This alternative proposes 213 miles of roads within the Monument. Segregation of road uses would be incorporated into this alternative to reduce conflicts between bike, foot and horse travel, as well as between motorized and non-motorized travel. A total of 102 miles of roads would be designated open to all forms of travel. All motorized and mechanized travel would be restricted to designated roads.

Alternative IV would have the fewest restrictions for motorized and mechanized access throughout the Monument. Alternative IV would emphasize more destination facilities to support the transportation system than would all of the other alternatives (20 facilities). No existing user-created roads would be closed. This increase in available roads may encourage the public to explore more of the Monument.

Other Resources Management

Spectacular scenery is one of the primary reasons people come to the Monument to recreate. Therefore, to protect this resource, visual quality would be managed. Visual quality is measured on a scale from Class I (most pristine) to Class V (most altered). This alternative would manage 25,976 acres as Class I; 27,535 as Class II; 94,327 acres as Class III; and 17,497 acres as Class IV.

Alternative V (Preferred Alternative)***Recreation Management***

This alternative defines the Monument in terms of RMZs. Each zone would be managed in terms of its defined objectives and setting. Certain zones would be managed and marketed for regional, national, and international visitors, while the majority of the Monument would be managed for visitation by local residents. Construction of facilities and infrastructure would be kept to a minimum, but would be constructed, as needed, in the more developed recreation zones. This alternative would promote a destination management strategy for some areas and an undeveloped strategy for others, and would manage for a mix of backcountry and frontcountry opportunities. Under this alternative, there would be an overall increase (when compared with Alternative I) in the total miles of roads available to travel on in the Monument.

Under this alternative, recreational shooting and geocaching would be prohibited monument-wide. Camping and campfires would not be allowed in the more developed management zones; however, these activities would be allowed within the majority of the Monument (in the less developed management zones).

In summary, approximately 7,875 acres would be managed for public visitation, and 157,460 acres would be managed for backcountry use. The transportation system for this alternative would consist of 169 miles of roads, which would allow for a combination of uses. Ten SRPs could be issued.

Cultural Resource Management

Under Alternative V, the Monument would be promoted as an outdoor museum, allowing visitors to experience cultural and natural resources through self-discovery. In addition, 13 to 25 cultural sites would be developed, directing visitors to more developed portions of the Monument. Cultural resources management under this alternative, may be beneficial to recreation.

Fluid Minerals Management

Under this alternative, up to 880 acres would become available for new mineral leases. Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Leases would stipulate that access be limited to one road for many of the energy developments. No increase in infrastructure development in new lease areas would occur along the Byway. A total of up to 18 acres of ground would be disturbed because of this alternative. However, given required stipulations, adverse impacts to recreation may be minimal.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to reduce conflicts between livestock grazing, recreating publics, and the protection of cultural resources. There would be a reduction of 2,055 active AUMs (from 8,492 to 6,437). Of primary benefit to recreating publics, may be closing five livestock allotments to livestock grazing (which are located in an area popular to hikers, mountain bike riders, and horseback riders, i.e., Sand Canyon/East Rock. The removal of livestock from these areas may further eliminate impacts to cultural resources resulting from livestock and conflicts of use on trails.

Transportation Management

This alternative would allow 169 miles of roads within the Monument. Some separation of roads between bike, foot, and/or horse would occur, which may help to alleviate conflicts in the Sand Canyon/East Rock Creek area. A total of 74 miles of roads would be designated open to all forms of travel. All motorized and mechanized travel would be restricted to designated roads.

Alternative V would promote low-impact activity, but would add minimal facilities and infrastructure (11 facilities), thereby not disturbing the pristine experience of the area. Several user-created roads would be closed.

Other Resources Management

Spectacular scenery is one of the primary reasons people come to the Monument to recreate. Therefore, in order to protect this resource, visual quality would be managed. Visual quality is measured on a scale from Class I (most pristine) to Class V (most altered). This alternative would manage 38,598 acres as Class I; 126,643 as Class II; and 94 acres as Class II. Alternative V may be more beneficial to recreation than Alternatives III and IV.

4.2.17.3. Recreation Management Impact Comparison

The recreation management impact comparison is presented in Table 4-26. This table compares the consequences of resource management actions under each alternative on recreation management.

4.2.17.4. Cumulative Impacts

Regionally and nationally, recreation is on the increase. As more and more people find themselves living in urban environments, the demand to recreate on public lands is becoming more intense. Depending on the target audience and the marketing strategy, those visiting the Monument may be primarily local residents, regional visitors, or national and international tourists. Managing the Monument for day-use visitors, by restricting access and camping, as Alternative II would propose, may likely move those seeking overnight camping opportunities to neighboring public lands. Providing limited facilities, yet offering a range of recreation opportunities, as described under Alternative V, may provide for day-use activities and overnight opportunities for dispersed camping. The absence of developed campgrounds with

facilities for camp trailers may result in visitors who are looking for these amenities to use other public lands and/or private facilities. This concept of shifting uses based on what is or is not authorized in the Monument may be applied to all uses, including recreational shooting, geocaching, and others.

Marketing for national and international tourism may increase visitation to the region and may boost the economic income of local counties, businesses, and residents. Depending on the influx of people that may result, regional infrastructure may be insufficient to support the demand. Services, such as Search and Rescue and/or law enforcement, may be strained.

Increased recreation opportunities may result in an increased demand for infrastructure, which may cause visual impacts to the natural landscape. Construction of facilities with associated ground disturbance may result in loss of wildlife habitat and the possibility for erosion with additional sediments in stream systems. Noise levels from increased human presence (voices and vehicular) may reduce wildlife habitat security.

Table 4-26 Comparison of Impacts to Recreation Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Recreation	Maintain developed recreation sites at Lowry, Painted Hand, and Sand Canyon for interpretation. Allow no new commercial permits. Allow dispersed recreational camping. Retain existing limitations and closures. No restrictions on geocaching, climbing or shooting.	Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry use. Allow no new SRPs, no renewal of existing SRPs. Prohibit camping, campfires, recreational shooting, geocaching, and climbing.	Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry use. Allow no new SRPs. Allow renewal of existing SRPs. Allow camping and campfires within Mockingbird Mesa-Rincon, Squaw-Cross Canyons, and Goodman Point SRMAs. Do not allow geocaching, climbing or shooting anywhere in the Monument.	Manage 47,056 acres for public visitation. Manage 118,279 acres for backcountry use. Allow new SRPs on a case-by-case basis. Allow camping and campfires within Mockingbird Mesa-Rincon, Squaw-Cross Canyons, and Goodman Point SRMAs, and in designated sites in other SRMAs. Do not allow geocaching, climbing or shooting anywhere in the Monument.	Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry use. Allow 10 SRPs. Allow camping and campfires within Mockingbird Mesa-Rincon, Squaw-Cross Canyons, and Goodman Point SRMAs. Allow climbing in designated sites only. Do not allow geocaching or shooting anywhere in the Monument.
Cultural Resources	Develop new sites for controlled visitation.	Develop 13 sites for visitation.	Develop 13 to 25 sites for visitation.	Develop 13 to 25 sites for visitation.	Develop 13 to 25 sites for visitation.
Fluid Minerals	No Impact.	Make up to 880 new acres available for lease (with up to 18 acres or disturbance).	Make up to 3,021 new acres available for lease (with up to 73 acres of disturbance).	Make up to 24,462 new acres available for lease (with up to 447 acres of disturbance).	Make up to 880 new acres available for lease (with up to 18 acres of disturbance).

Table 4-26 Comparison of Impacts to Recreation Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Rangeland	Permit 8,492 AUMs. Manage 28 allotments.	Permit 6,437 AUMs; Manage 23 allotments.	Permit 8,368 AUMs. Manage 23 allotments.	Permit 8,492 AUMs. Manage 28 allotments.	Permit 6,437 AUMs. Manage 23 allotments.
Transportation	Manage 149 miles roads. Allow 7 transportation facilities.	Manage 139 miles roads. Allow 7 transportation facilities.	Manage 189 miles roads. Allow 13 transportation facilities.	Manage 213 miles roads. Allow 20 transportation facilities.	Manage 169 miles roads. Allow 11 transportation facilities.
Other Resources: Visual Resources	Manage 25,976 acres as VRM Class I. Manage 139,265 acres as VRM Class II, Manage 94 acres as VRM Class III.	Manage 38,598 acres as VRM Class I. Manage 126,643 acres as VRM Class II. Manage 94 acres as VRM Class III.	Manage 25,976 acres as VRM Class I. Manage 34,754 acres as VRM Class II. Manage 104,605 acres as VRM Class III.	Manage 25,976 acres as VRM Class I. Manage 27,535 acres as VRM Class II. Manage 94,327 acres as VRM Class III. Manage 17,497 acres as VRM Class IV.	Manage 38,598 acres as VRM Class I. Manage 126,643 acres as VRM Class II. Manage 94 acres as VRM Class III.

4.2.18. Transportation

The primary goal for transportation management is to define a travel management network (i.e., system of areas and roads), with supporting facilities (e.g., parking areas), that provides reasonable access to the public, private landowners, and authorized users (e.g., fluid mineral operators and livestock grazing permittees) while, at the same time, protecting the objects identified in the Proclamation. (NOTE: For the purpose of this DRMP/DEIS, a “road” is defined as an open way for the passage of vehicles, persons, or animals on land, regardless of the type of travel; and “off-road” is defined as cross-country travel between designated roads.) All off-road travel by motorized and/or mechanized vehicles is prohibited in the Monument. The management objectives related to this goal include:

- designate administrative roads, by type of use (e.g., street-legal motorized vehicle and OHV) for authorized users only. These are roads that lead to private land or developments that have an administrative purpose where the BLM or permitted user/private landowner must have access for regular maintenance or operation. These authorized developments include power lines, weather stations, oil and gas facilities, spring developments, corrals, and water troughs. All types of use include street legal motorized vehicle, OHV, dirt bike, foot, horse, and bicycle;
- designate existing and new roads for different types (e.g., street-legal motorized vehicle and OHV) of motorized and non-motorized public access, following the travel management network methodology in Appendix G. (In summary, this methodology closes existing roads that do not access a destination (e.g., scenic overlook, camping site, or archaeological site allocated for public use) and/or that pose a threat to Monument resources. All types of use include street-legal motorized vehicle, OHV, dirt bike, foot, horse, and bicycle);
- designate travel management areas to protect Monument objects and to prohibit all off-road motorized and mechanized vehicle use, except for emergency or authorized administrative purposes, as required under the Proclamation;
- identify the types and locations of facilities necessary to support the functions of the transportation management network;
- identify maintenance activities required to protect the objects of the Monument;
- identify criteria that would assist in deciding if additional roads should be added or removed from the transportation management network in the future;
- work in partnership with the CDOW to determine limitations (e.g., season of use and density level), if any, on new road construction to protect big game winter range and migration corridors within the Monument;
- identify guidelines and/or limitations to properly maintain, manage, and/or monitor the travel management network;
- work in partnership with affected interests to manage overflights and achieve and maintain visitor experiences and benefits within RMZs;
- manage access to oil and gas leases issued prior to passage of the FLPMA in existing WSAs, and ensure that the BLM non-impairment standard is not violated; and
- work in partnership with affected interest groups to manage roads to protect resources and maintain visitor experiences and benefits.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to transportation management.

Direct beneficial impacts to transportation may include increased access to authorized users, protecting Monument resources, and increased public safety. Indirect impacts may include changes in the type of traffic or level of use.

4.2.18.1. Evaluation Criteria and Assumptions

Quantifying individual impacts to transportation management is difficult due to the fact that the location of potential impacts cannot be determined. The location and extent of some new roads and parking areas can be identified, but the location and extent of roads associated with oil and gas development cannot be predicted. Quantitative estimates of road length and acreage are used, when possible.

Assumptions used in analyzing impacts to transportation management include the following:

- Estimates of disturbance were compiled from the AMS (BLM 2005b) and the RFD (BLM 2005c).
- The number of roads predicted for construction, based on new acres leased for mineral development, would all be new roads.
- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Cumulative impacts include the counties of Dolores and Montezuma.
- State laws apply to the Monument. For example, should an alternative show a road as being open to OHV travel, if it is prohibited by state law, the state law will apply.
- While travel cross-country (i.e., off-road) to retrieve game during the hunting season may be authorized on other public lands, it is not authorized within the Monument.
- Several transportation terms from 43 CFR 8340.0-5 are defined for the reader.
 - **Off-road:** cross-country travel between designated roads. All off-road travel is prohibited by motorized and mechanized vehicles.
 - **Open areas:** areas where both cross-country and designated road travel is allowed by all types of vehicles, at all times, anywhere in the area, subject to the operating regulations and vehicle standards set forth in subparts 43 CFR 8341 and 8342. There are no “open areas” within the Monument.
 - **Limited areas:** areas restricted at certain times, in certain areas and/or to certain vehicular use. Generally, these are areas where mechanized and/or motorized travel is restricted to designated roads only. No cross-country travel is allowed.
 - **Closed areas:** areas where all types of mechanized and motorized travel are not permitted off roads and, in this case, where for the most part, roads do not exist and are not to be constructed, such as WSAs.
 - **Off-highway vehicle (OHV):** any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain. Typically, this refers to All-Terrain-Vehicles (ATVs).
 - **Cross-Country travel:** travel between designated roads.

- **Administrative roads:** roads restricted from general public use. These roads are used for administration of oil and gas facilities, livestock grazing structures, research areas, and other such administrative uses. They are generally open for public travel by horseback or hiking (foot).
- **Public roads:** these roads are open to the public, but may be restricted in terms of the type of travel allowed. For example, there are motorized and non-motorized public roads.
- **Motorized travel:** travel that uses some form of motorized vehicles, including dirt bikes (i.e., motorcycles), OHV (i.e., ATVs), and/or four-wheel and two-wheel drive full-size vehicles.
- **Non-motorized travel:** travel not using a form of machinery, such as foot (hiking) or horseback riding.
- **Mechanized travel:** travel using self-propelled bicycles. This is sometimes included in the definition of “non-motorized” but making the distinction is often important.

4.2.18.2. Alternative Analysis

Impacts to transportation may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for transportation, as well as those anticipated to result from management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation management.

Alternative I (No Action Alternative)

Transportation Management

The No Action Alternative for transportation is based on the San Juan/San Miguel RMP (BLM 1985). Since that time, several user and development-created roads have been constructed. Therefore, the miles and map for Alternative I roads do not reflect what is currently in the Monument. Since this is the No Action Alternative, it does not include the development of a comprehensive transportation plan, which the Proclamation mandates.

The transportation system under Alternative I would consist of 149 miles of roads that include the following:

- Administrative + Public Foot, Horse = 7 miles;
- Administrative + Public Foot, Horse, Bicycle = 3 miles;
- Public Foot = 2 miles;
- Public Foot, Horse = 0 miles;
- Public Foot, Horse, Bicycle = 6 miles;
- Public Foot, Horse, Bicycle, Dirt Bike, OHV = 0 miles; and
- Public Open to All Travel Means = 131 miles.

Under this alternative, the Monument travel system would include 149 miles (864 acres) of roads for motorized, mechanized, and/or non-motorized use. There would be no additional roads for new fluid mineral leasing. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. All cross-country motorized and/or mechanized travel would be

prohibited within the Monument. Under this alternative, 139,359 acres would be designated “limited” and 25,976 acres would be designated “closed.” Under Alternative I, Monument roads would be maintained or upgraded to ensure public safety. Impacts to the transportation network would not change under this alternative.

Cultural Resources Management

Cultural resources management, under Alternative I, would include stabilizing with some development of 240 sites, and other areas with controlled visitation and various levels of interpretation; managing data and collected material to enhance public awareness of resources through interpretation by the AHC; and developing and protecting suitable cultural resources for public enjoyment. Roads would be closed, when necessary, in order to limit access and to protect cultural resources. There may be beneficial impacts associated with this alternative due to the fact that an increase in developed sites may result in additional roads.

Fluid Minerals Management

Under this alternative, no new areas would be made available for fluid minerals leasing; therefore, this alternative would have no impact on the transportation system.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. Use of the transportation system by livestock grazing permittees may be expected to continue, as under current management, with 8,492 AUMs and 28 allotments. This management may not have any impact on transportation.

Recreation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, and maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. No new SRPs would be issued. An off-road vehicle management program would be implemented and some OHV designations would occur. This alternative contains no promotion strategy for the Monument; therefore, visitation may be expected to continue to grow at the same rate as in the local region. There is no impact to transportation management because of this alternative.

Other Resources Management

Under this alternative, a soil SSR/CSU would be applied for slopes greater than 40 percent, (21,036 acres). The SSR/CSU would require an engineering/reclamation plan that demonstrates how site productivity would be restored, how surface runoff would be controlled, and how offsite areas would be protected from accelerated erosion. Additionally, surface-disturbing activities would not be allowed during extended wet periods. This may have a beneficial impact on transportation because road safety may be enhanced.

Alternative II

Transportation Management

The transportation system under Alternative II (excluding one mile of new fluid minerals roads) would consist of 138 miles of roads (excluding up to one mile of new fluid mineral development road) that include the following:

- Administrative + Public Foot, Horse = 79 miles;
- Administrative + Public Foot, Horse, Bicycle = 0 miles;
- Public Foot = 9 miles;
- Public Foot, Horse = 0 miles;

- Public Foot, Bicycle = 0 miles;
- Public Foot, Horse, Bicycle = 0 miles;
- Public Foot, Horse, Bicycle, Dirt Bike, OHV = 0 miles; and
- Public Open to All Travel Means = 50 miles.

Under this alternative, roads would be maintained, but upgrades would not be allowed. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. All cross-country motorized and mechanized travel would be prohibited within the Monument. Under this alternative, 126,737 acres would be designated “limited” and 38,598 acres would be designated “closed”.

Cultural Resources Management

Cultural resource management, under Alternative II, would include developing 13 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. Road maintenance efforts would focus on areas where visitors are directed. The majority of the Monument, however, would be promoted as an outdoor museum, allowing visitors to experience the Monument through self-discovery. This alternative would protect cultural resource communities, sites, and/or isolated finds to protect the potential for archaeological information at the landscape scale. Protecting large blocks of land may prevent future road development from weaving between individual cultural sites.

Fluid Minerals Management

Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. A total of up to 18 acres of new ground disturbance would be possible under this alternative, and one mile of additional road would be required. Geophysical operations would be restricted to BLM-defined roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NSO stipulations for slopes greater than 30 percent (up to 36,504 acres) would apply, and BMPs would be included in COAs for new leases. Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Impacts to the transportation system may include increased traffic, with large vehicles possibly impacting public safety.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. Use of the transportation system by livestock grazing permittees may be expected to continue. This management may have little or no impact on transportation.

Recreation Management

Alternative II would promote low-impact activity, and would have the greatest restrictions for motorized vehicle access throughout the Monument. Approximately 8,211 acres would be managed for public visitation and 157,124 acres would be managed for backcountry use. Alternative II would identify and manage RMZs and SRMAs. It would add minimal facilities and infrastructure, and may, therefore, not disturb the experience of the area. No new roads would be authorized. This alternative would promote a non-developed strategy for the Monument; therefore, backcountry visitation may experience the greatest growth from local residents and incidental visitors.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This may result in beneficial impacts to transportation due to the fact that public safety on roads may be enhanced.

Alternative III**Transportation Management**

The transportation system, under Alternative III, would consist of 189 miles of roads (excluding three miles of new fluid minerals roads) that include the following:

- Administrative + Public Foot, Horse = 11 miles;
- Administrative + Public Foot, Horse, Bicycle = 21 miles;
- Public Foot = 1 miles;
- Public Foot, Horse = 21 miles;
- Public Foot, Bicycle = 1 mile;
- Public Foot, Horse, Bicycle = 9 miles;
- Public Foot, Horse, Bicycle, Dirt Bike, OHV = 9 miles; and
- Public Open to All Travel Means = 60 miles.

Under this alternative, parking lots would be expanded and surface upgrades of roads would be authorized to protect public safety and/or Monument resources. The total mileage of roads would increase from 149 miles under Alternative I to 186 miles under Alternative III.

Under this alternative, there would be nine miles of roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be also allowed on roads designated as open to all forms of travel. All cross-country motorized and mechanized travel would be prohibited within the Monument. Under this alternative, 139,024 acres would be designated "limited" and 25,976 acres would be designated "closed". Impacts to the transportation system under Alternative III would be the requirement of the BLM to maintain a greater number of roads than under the No Action Alternative.

Cultural Resource Management

Cultural resource management, under Alternative III, would include developing 13 to 25 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. Road maintenance efforts would focus on areas where visitors are directed. The majority of the Monument, however, would be promoted as an outdoor museum, allowing visitors to experience the Monument through self-discovery. This alternative would protect cultural resource communities and/or sites in order to protect the potential for archaeological information at the landscape scale. Protecting large blocks of land may prevent future road development from weaving between individual cultural sites.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres would be available for leasing. Up to 73 acres of new ground disturbance would be possible under this alternative, and three miles of additional roads may be required. Geophysical operations would be restricted to BLM-defined roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NSO stipulations for slopes greater than 30 percent (up to 36,504 acres) would apply, and BMPs would be included in COAs for new leases. Protective measures in leased

areas would include the consolidation of maintenance activities in order to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Impacts to the transportation system may include increased traffic, with large vehicles possibly impacting public safety. Due to the fact that up to eight additional wells would likely be drilled because of this alternative, adverse impacts to the transportation may occur because of the increase in traffic.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. Use of the transportation system by livestock grazing permittees may be expected to continue. This management may have little or no impact on transportation.

Recreation Management

Alternative III defines the Monument in terms of RMZs and SRMAs. This alternative would promote low-impact activity, and would add facilities and infrastructure to support recreation uses. Approximately 18,875 acres would be managed for public visitation and 146,460 acres would be managed for backcountry use. Although some existing user-created roads would be closed and reclaimed, the overall increase in available road access may encourage the public to explore more of the Monument. This alternative would promote a destination strategy for regional visitors to the Monument; therefore, growth in visitation may be realized. Recreation management may have beneficial impacts to transportation since public safety may be enhanced by the additional roads.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This may result in beneficial impacts to transportation since public safety on roads may be enhanced.

Alternative IV

Transportation Management

The transportation system, under Alternative IV, would consist of 194 miles of roads (excluding 19 miles new fluid minerals roads) that are summarized as follows:

- Administrative + Public Foot, Horse = 31 miles;
- Administrative + Public Foot, Horse, Bicycle = 7 miles;
- Public Foot = 4 miles;
- Public Foot, Horse = 12 miles;
- Public Foot, Bicycle = 0 miles;
- Public Foot, Horse, Bicycle = 19 miles;
- Public Foot, Horse, Bicycle, Dirt Bike, OHV = 19 miles; and
- Public Open to All Travel Means = 102 miles.

Under this alternative, parking lots would be expanded, and surface upgrades of roads would be authorized to protect public safety and/or Monument resources. The total mileage of roads would increase from 149 miles under Alternative I to 213 miles under Alternative IV.

Under this alternative, there would be 19 miles of roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would also be allowed on roads

designated as open to all forms of travel. Cross-country motorized and/or mechanized travel would be prohibited. Under this alternative, 139,359 acres would be designated “limited” and 25,976 acres would be designated “closed”. Impacts to the transportation system under Alternative IV may be beneficial due to the fact that more roads would be built to access the Monument and public safety may be enhanced.

Cultural Resources Management

Cultural resource management, under Alternative IV, would include stabilizing and/or developing 13 to 25 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. Road maintenance efforts would focus on areas where visitors are directed. The majority of the Monument, however, would be promoted as an outdoor museum, allowing visitors to experience the Monument through self-discovery. This alternative would protect cultural resource communities and/or sites in order to protect the potential for archaeological information at the landscape scale. Protecting large blocks of land may prevent future road development from weaving between individual cultural sites.

Fluid Minerals Management

Under Alternative IV, up to 24,462 acres would be available for leasing. A total of up to 447 acres of new ground disturbance would be possible under this alternative, and up to 19 miles of additional roads may be required. Geophysical operations would be restricted to BLM-defined roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NSO stipulations for slopes greater than 30 percent (up to 36,504 acres) would apply, and BMPs would be included in COAs for new leases. Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Impacts to the transportation system may include increased traffic, with large vehicles possibly impacting public safety. Due to the fact that up to 59 additional wells would likely be drilled because of this alternative, resulting in up to 19 miles of new roads, adverse impacts from increased traffic may occur.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. Use of the transportation system by livestock grazing permittees would be expected to continue, as under current management. This management may not have any impact on transportation.

Recreation Management

Alternative IV would identify and manage RMZs and SRMAs, and would emphasize the development of facilities and infrastructure to support recreation and transportation uses. Approximately 47,056 acres would be managed for public visitation and 118,279 acres would be managed for backcountry use. No existing user-created roads would be closed, and cross-country foot traffic and/or horseback riding would be permitted. This overall increase in available roads and cross-country access may encourage the public to explore more of the Monument. This alternative would promote a destination strategy for national and international visitors to the Monument; therefore, growth in visitation may be realized. Recreation management may have beneficial impacts to transportation since public safety may be enhanced by the additional roads.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This may result in beneficial impacts to transportation due to the fact that public safety on roads may be enhanced.

Alternative V (Preferred Alternative)

Transportation Management

The transportation system, under Alternative V, would consist of 168 miles of roads (excluding up to 1 mile of new fluid minerals roads), summarized as follows:

- Administrative + Public Foot, Horse = 59 miles;
- Administrative + Public Foot, Horse, Bicycle = 0 miles;
- Public Foot = 3 miles;
- Public Foot, Horse = 1 mile
- Public Foot, Horse, Bicycle = 23 miles;
- Public Foot, Horse, Bicycle, Dirt Bike, OHV = 8 miles; and
- Public Open to All Travel Means = 74 miles.

Under this alternative, roads would be maintained, but upgrades would not be allowed. The total mileage of roads would be increased from 149 miles under Alternative I, to 169 miles under Alternative V, and the total mileage of roads open to all travel means by the public would be reduced from 131 to 74 miles.

Under this alternative, there would be 19 miles of roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be also allowed on roads designated as open to all forms of travel. Under this alternative, 126,737 acres would be designated "limited" and 38,598 acres would be designated "closed". All cross-country motorized and mechanized travel would be prohibited. Impacts to the transportation system under Alternative V may be beneficial because more roads would be built to access the Monument and, therefore, public safety may be enhanced.

Cultural Resources Management

Cultural resource management, under Alternative V, would include stabilizing and/or developing 13 to 25 sites for public use, preparing Cultural Resource Management Plans for these sites, and evaluating SRPs for site visits. Road maintenance efforts would focus on areas where visitors are directed. The majority of the Monument, however, would be promoted as an outdoor museum, allowing visitors to experience the Monument through self-discovery. This alternative would protect cultural resource communities and/or sites to protect the potential for archaeological information at the landscape scale. Protecting large blocks of land may prevent future road development from weaving between individual cultural sites.

Fluid Minerals Management

Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. Up to a total of 18 acres of new ground disturbance would be possible under this alternative and up to one mile of additional road would be required. Geophysical operations would be restricted to BLM-defined roads. Seismic operations requiring bulldozers, earthmoving equipment, and/or explosives would be prohibited. Soil resource NGD/NSO stipulations for slopes greater than 30 percent (up 36,504 acres) would apply, and BMPs would be included in COAs for new leases. Protective measures in leased areas would include the consolidation of maintenance activities

to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Impacts to the transportation system may include increased traffic, with large vehicles possibly impacting public safety.

Rangeland Resources Management

Under this alternative, rangeland resources would be managed to improve Public Land Health Standards and to protect Monument objects. Use of the transportation system by livestock grazing permittees would be expected to continue. This management may have little or no impact on transportation.

Recreation Management

Alternative V would promote low-impact activity, but would provide for motorized vehicle access throughout the Monument. Approximately 7,875 acres would be managed for public visitation and 157,460 acres would be managed for backcountry use. Alternative V would identify and manage RMZs and SRMAs, but would add minimal facilities and infrastructure, thereby not disturbing the pristine experience of the area.

Other Resources Management

Under this alternative, a soil NGD/NSO for slopes greater than 30 percent (36,504 acres) would apply, and BMPs would be required for all ground-disturbing activities. This may result in beneficial impacts to transportation because public safety on roads may be enhanced.

4.2.18.3. Transportation Management Impact Comparison

The transportation management impact comparison is presented in Table 4-27. This table compares the consequences of resource management actions under each alternative on transportation management.

4.2.18.4. Cumulative Impacts

Impacts to the local road systems in, and/or near, the Monument would likely include the need for expansion and maintenance, depending on area population growth. This may result from nearby agriculture fields being subdivided and developed primarily for residences, as well as from an influx of recreating publics. Private, county, and state road maintenance costs may continue to reflect the increased level of need, but funds may be focused more on developed and primary access roads. In terms of maintenance, less developed, natural surface roads (as occurs within the Monument) would depend on national funding. This funding may not increase at the rate in which maintenance is needed. As use of the public lands increases, these impacts may increase.

The increase in road mileage in the Monument resulting from fluid minerals exploration and development on existing leases over the next 20 years is estimated at 67 miles. These new roads may result in up to 360 acres of surface disturbance. Currently, there are 196 miles (1,053 acres) of roads for fluid mineral access. Most of the maintenance costs for these roads are covered by the developer.

Depending on residential and tourist growth in the Monument area, additional parking areas and developed site facilities may be required. In terms of protecting the objects of the Monument, additional law enforcement may be needed, due to more user-created roads and increased cross-country travel.

As a result of increased demand for infrastructure, visual impacts to the natural landscape may occur. Construction of facilities with associated ground disturbance may result in loss of wildlife

habitat and the possibility for erosion with additional sediments in stream systems. Noise levels from increased human presence (voices and vehicular) may reduce wildlife habitat security.

Table 4-27 Comparison of Impacts to Transportation Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Transportation	Manage 149 miles of roads. Designate 139,359 acres "limited" and 25,976 acres "closed" to OHV travel.	Manage 139 miles of roads. Designate 126,737 acres "limited" and 38,598 acres "closed" to OHV travel.	Manage 189 miles of roads. Designate 139,359 acres "limited" and 25,976 acres "closed" to OHV travel.	Manage 213 miles of roads. Designate 139,359 acres "limited" and 25,976 acres "closed" to OHV travel.	Manage 169 miles of roads. Designate 262,737 acres "limited" and 38,598 acres "closed" to OHV travel.
Cultural Resources	Develop new sites for controlled visitation, resulting in greater need for roads.	Develop 13 sites, resulting in less need for roads.	Develop 13 to 25 sites, resulting in less need for roads.	Develop 13 to 25 sites, resulting in less need for roads.	Develop 13 to 25 sites, resulting in less need for roads.
Fluid Minerals	No Impact.	Make up to 880 new acres available for lease. Allow up to 2 new well pads (with up to 1 mile of new roads).	Make up to 3,021 new acres available for lease. Allow up to 8 new well pads (with up to 3 miles of new roads).	Make up to 24,462 new acres available for lease. Allow up to 59 new well pads (with up to 19 miles of new roads).	Make up to 880 new acres available for lease. Allow up to 2 new well pads (with up to 1 mile of new roads).
Rangeland Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Recreation	Promote no specific recreation strategy. Develop new roads as needed.	Promote undeveloped strategy with minimum facilities for local visitors. Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry	Promote destination strategy with appropriate support facilities for regional visitors. Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry	Promote destination strategy with more facilities for national and international visitors. Manage 47,056 acres for public visitation. Manage 118,279 acres for backcountry	Promote combination of strategies for local, regional, national, and international visitors. Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry

Table 4-27 Comparison of Impacts to Transportation Management					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Other Resources: Soil Resources	Apply SSR/CSU to protect slopes greater than 40 percent (21,036 acres).	use. Apply NGD/NSO for slopes steeper than 30 percent (36,504 acres).	use. Apply NGD/NSO for slopes steeper than 30 percent (36,504 acres).	use. Apply NGD/NSO for slopes steeper than 30 percent (36,504 acres).	use. Apply NGD/NSO for slopes steeper than 30 percent (36,504 acres).

4.3. Special Designations

4.3.1. Areas of Critical Environmental Concern

The primary goal for Areas of Critical Environmental Concern (ACEC) is to provide consistent protection and management to important cultural sites. The management objective related to this goal is to manage in order to maintain and/or to enhance the special resource values within the Monument.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to ACECs.

Beneficial impacts may include actions that further enhance and/or protect ACECs for the purposes they were designated. Adverse impacts may include, but are not limited to, actions that might diminish the value of the area being protected.

4.3.1.1. Evaluation Criteria and Assumptions

Evaluation criteria for comparing impacts under the various alternatives on ACECs depend on the purpose of the designation. In the case of Canyons of the Ancients, the designation was to protect cultural resources.

Assumptions used in analyzing impacts to special designation areas include the following:

- This impact analysis considers the spatial boundary to be the existing limits of the ACEC, and the temporal boundary as the 20-year planning horizon. This would apply to both individual and cumulative impacts analyses.

4.3.1.2. Alternative Analysis

Impacts to ACECs may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for ACECs, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, recreation and transportation, and for other resources.

Alternative I (No Action Alternative)

Areas of Critical Environmental Concern Management

Alternative I would maintain the current designation of the Anasazi Cultural Multiple Use Area ACEC on 165,335 acres. Private lands within the ACEC would not be affected by this designation. In addition, management actions would provide multiple-use opportunities, and closer monitoring of surface-disturbing activities. Alternative I would propose no change to the current management conditions of the ACEC; therefore, there would be no new impacts to the ACEC. Current impacts and/or adverse trends, however, may continue and may continue to diminish ACEC values.

Cultural Resources Management

Alternative I would manage cultural resources to preserve and protect them throughout the ACEC. This alternative may have beneficial impacts to the ACEC by furthering the goals for which the ACEC was designated, and continuing to providing a multiple-use area while, at the same time, protecting the area's natural, biological, and cultural resources.

Fluid Minerals Management

This alternative would have no new fluid mineral leases. Existing leases would continue and would not be affected. This alternative may have no new impacts on existing ACECs.

Rangeland Resources Management

Under this alternative, rangeland resources management would permit 8,492 active AUMS. There would be no new management actions pertaining to livestock management. Impacts to resources of the ACEC may continue, as under current management, which, in some cases, may result in a continued decline. In areas where livestock grazing is preventing Public Land Health Standards from being met, this condition may likely continue.

Recreation and Transportation Management

In general, the fewer the number of roads, the less the ground disturbance and associated resource damage, and the less impact to vegetation, water, soil, and/or to scenic values. Under this alternative, there would be 149 miles of roads within the ACEC. This may result in a road density of 0.58 miles per square mile and a ground disturbance totaling 864 acres. Visitation to the area may impact the character and the quality of pristine areas. Maintaining large areas for a backcountry experience may help to direct the majority of visiting publics to a few specific developed locations (i.e., Lowry, Painted Hand, and Sand Canyon Pueblo).

Other Resources Management

Alternative I would protect 2,415 acres of riparian system. There would be no restrictions on groundwater or new water developments in this alternative. This alternative may be the least protective of water resources.

Alternative II

Areas of Critical Environmental Concern Management

Under Alternative II, the ACEC designation would be removed because the Presidential designation of the Anasazi Cultural Multiple Use Area ACEC as a National Monument supersedes the administrative ACEC designation. In addition, management actions would continue to provide multiple-use opportunities in the Monument, but would primarily emphasize cultural resource values at the community, site, and/or at the isolated find levels. This level of protection would provide for large undisturbed areas and a greater potential for recovering information from cultural resource landscapes. Similarly, this alternative would continue to provide closer monitoring of surface-disturbing activities.

Cultural Resources Management

Under Alternative II, the Monument would be managed as an outdoor museum, allowing backcountry exploration and self-discovery experiences of archaeological sites. In addition, 13 cultural sites would be developed for public visitation. This may have beneficial impacts by facilitating visitation through roads, interpretive signs, and education. The development of these cultural resource sites may enhance visitor experiences, promote concern for cultural resource protection, and help prevent impairment of these resources.

Fluid Minerals Management

Under this alternative, fluid minerals exploration and development would be required to protect cultural resource communities, sites, and/or isolated finds. This may help to protect large blocks of land. Up to 880 acres would be available for new leases, but only to protect against drainage. Up to 18 acres may be disturbed because of new fluid minerals management for this alternative.

Rangeland Resources Management

Alternative II would decrease permitted livestock grazing to 6,437 AUMs and five livestock grazing allotments would be closed. The reduction in AUMs, closed allotments, and addition of intense management may improve land health. This management may result in beneficial impacts due to the fact that cultural resources may sustain fewer impacts from livestock rubbing and/or trampling, and due to the fact that the reduction in erosion (from increased vegetative cover) may help hold cultural artifacts on site.

Recreation and Transportation Management

In general, the fewer the number of roads, the less the ground disturbance and associated resource damage, and the less impact to vegetation, water, soil, and/or to scenic values. Under this alternative, there would be 139 miles of roads. This may result in a road density of 0.54 miles per square mile and a ground disturbance totaling 806 acres. This alternative would propose the least number of roads. This alternative would maintain a majority of the Monument for a backcountry experience. Alternative II would manage 8,211 acres for public visitation and 157,124 acres for backcountry experiences.

Other Resources Management

Alternative II would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Groundwater and new water developments would be discouraged. This alternative, along with Alternative V, may be the most protective of water resources.

Alternative III**Areas of Critical Environmental Concern Management**

Management actions under Alternative III are similar to those proposed under Alternatives II, IV, and V. Under Alternative III, the ACEC designation would be removed. In addition, management actions would continue to provide multiple-use opportunities in the Monument, but would primarily emphasize cultural resource values at the community and at the site levels. This level of protection would provide for larger undisturbed areas and for a greater potential for recovering information from cultural resource landscapes. Similarly, this alternative would continue to provide closer monitoring of surface-disturbing activities, but would primarily emphasize cultural resource values.

Cultural Resources Management

Under Alternative III, the Monument would be managed as an outdoor museum, allowing backcountry exploration and self-discovery experiences of archaeological sites. In addition, 13 to 25 cultural sites would be developed for public visitation. This may have beneficial impacts due to the fact that it may facilitate visitation through roads, interpretive signs, and education. The development of these cultural resource sites may enhance visitor experiences, promote concern for cultural resource protection, and prevent impairment of these resources.

Fluid Minerals Management

Under this alternative, fluid minerals exploration and development would be required to protect cultural resource communities and sites. This may help to protect large blocks of area from ground disturbance. Up to 3,021 acres would be available for new leases, resulting in up to 73 acres of ground disturbance. Although NSO stipulations would apply, some adverse impacts may occur due to noise, construction of facilities impacting visual quality, and to the release of materials that may impact air quality.

Rangeland Resources Management

Alternative III would reduce livestock grazing to 8,368 AUMs through closing five allotments. The reduction in AUMs would occur in an area rich with archaeological sites; therefore, their protection from livestock tramping and rubbing may help to protect the objects of the Monument. Beneficial impacts may be realized from other intensive management actions proposed under this alternative, as well. However, these benefits may occur over a longer time period than expected under Alternatives II and V, due to the fact that AUMs may not be reduced according to calculated capacity for Public Land Health Standards. Cultural resources may continue to sustain impacts from livestock rubbing and trampling at the same level, as under current management, except in the areas of closed allotments. The areas of closure may also show a reduction in erosion due to increased vegetative cover, which may help hold cultural resource artifacts on site. Impacts from this management may be beneficial.

Recreation and Transportation Management

In general, the fewer the number of roads, the less the ground disturbance and associated resource damage, and the less impact to vegetation, water, soil, and/or to scenic values. Under this alternative, there would be 189 miles of roads. This may result in a road density of 0.73 miles per square mile and a ground disturbance totaling 1,096 acres. Maintaining large areas for a backcountry experience may help to direct a majority of visiting publics to specific developed locations. This alternative would manage 18,875 acres for public visitation and 146,460 acres for backcountry experiences.

Other Resources Management

Alternative III would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Groundwater and new water developments would be allowed. Impacts from water resources management may be beneficial.

Alternative IV

Areas of Critical Environmental Concern Management

Under Alternative IV, the ACEC designation would be removed since designation as a National Monument supersedes the administrative designation of the ACEC. Management actions would continue to provide multiple-use opportunities in the Monument, but would primarily emphasize cultural resource values at the community and at the site levels. This level of protection may provide for large undisturbed areas and for a greater potential for recovering information from cultural resource landscapes. Similarly, this alternative would continue to provide closer monitoring of surface-disturbing activities, but would primarily emphasize cultural resource values.

Cultural Resources Management

Under Alternative IV, the Monument would be managed as an outdoor museum, allowing backcountry exploration and self-discovery experiences of archaeological sites. In addition, 13 to 25 cultural sites would be developed for public visitation. This may have beneficial impacts due to the fact that it may facilitate visitation through roads, interpretive signs, and education. The development of these cultural resource sites may enhance visitor experiences, promote concern for cultural resource protection, and prevent impairment of these resources.

Fluid Minerals Management

Under this alternative, fluid minerals exploration and development would be required to protect cultural resource communities and sites. Up to 24,462 acres would be available for new leases,

which would equate to up to 447 acres of ground disturbance. Fluid minerals management may result in adverse impacts due to the potential disturbance of cultural resources.

Rangeland Resources Management

Alternative IV would permit livestock grazing at 8,492 active AUMs. No improvement in land health would be anticipated from maintaining current AUM levels. Beneficial impacts may be realized from other intensive management actions proposed in this alternative. However, these benefits may occur over a longer time period than those expected under Alternatives II and V and, in some areas, may never be realized due to the fact that AUMs are not reduced according to calculated capacity for Public Land Health Standards. Cultural resources may continue to sustain impacts due to livestock rubbing and trampling at the same level as under current management. Erosion from decreased vegetative cover may impact cultural resources.

Recreation and Transportation Management

In general, the fewer the number of roads, the less ground disturbance and associated resource damage and the less impact to vegetation, water, soil, and/or to scenic values. Under this alternative, there would be 213 miles of roads. This may result in a road density of 0.83 miles per square mile and a ground disturbance totaling 1,235 acres. This alternative would propose the greatest number of roads. This alternative would manage 47,056 acres for public visitation and 118,279 acres for backcountry experiences. This alternative would designate the least amount of area within the Monument to backcountry experiences.

Other Resources Management

Alternative IV would protect 3,217 acres of riparian system, including riparian areas and floodplains (not canyon bottoms). Groundwater and new water developments would be encouraged to support expanded resource development. This alternative would provide for the least protection of water resources.

Alternative V (Preferred Alternative)***Areas of Critical Environmental Concern Management***

Under Alternative V, the ACEC designation would be removed because the Presidential designation of the Anasazi Cultural Multiple Use Area ACEC as a National Monument supersedes the administrative ACEC designation. Management actions would continue to provide multiple-use opportunities in the Monument, but would primarily emphasize cultural resources values at the community and site levels. This level of protection may provide large undisturbed areas and greater potential for recovering information from cultural resource landscapes. Similarly, this alternative may continue to provide closer monitoring of surface-disturbing activities.

Cultural Resources Management

Under Alternative V, the Monument would be managed as an outdoor museum, allowing backcountry exploration and self-discovery of archaeological sites. In addition, 13 to 25 cultural sites would be developed for public visitation. This may have beneficial impacts due to the fact that it may facilitate visitation through roads, interpretive signs, and education. The development of these cultural resource sites may enhance visitor experiences and prevent impairment of these resources.

Fluid Minerals Management

Under this alternative, fluid minerals exploration and development would be required to protect cultural resource communities and sites, and to fully document isolated finds. This may help to

protect large blocks of land from ground disturbance. Up to 880 acres would be available for new leases, but only to protect against drainage. This may result in up to 18 acres of ground disturbance.

Rangeland Resources Management

Alternative V would decrease livestock grazing to 6,437 permitted AUMs and would close five allotments to grazing. The reduction in AUMs and the addition of intense management may rapidly improve land health. Cultural resources may sustain fewer impacts from livestock rubbing and trampling, and the reduction in erosion from increased vegetative cover may help hold cultural resource artifacts on site.

Recreation and Transportation Management

In general, the fewer the number of roads, the less the ground disturbance and associated resource damage, and the less impact there is to vegetation, water, soil, and/or to scenic values. Under this alternative, there would be 169 miles of roads. This may result in a road density of 0.66 miles per square mile and a ground disturbance totaling 980 acres. However, this alternative would maintain large areas for a backcountry experience. This alternative would manage 7,875 acres for public visitation and 157,460 acres for backcountry experiences. This alternative would designate the most area within the Monument to backcountry experiences.

Other Resources Management

Alternative V would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Groundwater and new water developments would be discouraged. This alternative, along with Alternative II, would be the most protective of water resources.

4.3.1.3. Areas of Critical Environmental Concern Impact Comparison

The ACEC management impact comparison is presented in Table 4-28. This table compares the consequences of resource management actions under each alternative on ACECs.

4.3.1.4. Cumulative Impacts

There would be no cumulative impacts because of removing the ACEC designation, due to the fact that the Presidential designation of the Monument supersedes the administrative designation. A variety of impacts may occur that would diminish the purpose for declaring the Monument and ACEC. (Please refer to the analysis of cultural resources in this Chapter.)

Table 4-28 Comparison of Impacts to Areas of Critical Environmental Concern					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
ACEC	Maintain ACEC designation on 165,335 acres.	Drop ACEC designation, except for RNAs. Manage 7,826 acres as ACEC.	Drop ACEC designation, except for RNAs. Manage 427 acres as ACEC.	Drop ACEC designation, except for RNAs. Manage 427 acres as ACEC.	Drop ACEC designation, except for RNAs. Manage 7,826 acres as ACEC.
Cultural Resources	Protect cultural sites.	Protect cultural communities, sites, and isolated finds.	Protect cultural communities and sites.	Protect cultural communities and sites.	Protect cultural communities and sites.
Fluid Minerals	No Impact.	Make up to 880 new acres available for lease (with up to 18 acres of disturbance).	Make up to 3,021 new acres available for lease (with up to 73 acres of disturbance).	Make up to 24,462 new acres available for lease (with up to 447 acres of disturbance).	Make up to 880 new acres available for lease (with up to 18 acres of disturbance).
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs.
Recreation and Transportation	Maintain developed recreation sites. Manage 149 miles roads (with 864 acres of disturbance), 0.58 miles per square mile.	Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry use. Manage 139 miles roads (with 806 acres of disturbance), 0.54 miles per square mile.	Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry use). Manage 189 miles roads (with 1,096 acres of disturbance), 0.73 miles per square mile.	Manage 47,056 acres for public visitation. Manage 118,279 acres for backcountry use. Manage 213 miles roads (with 1,235 acres of disturbance), 0.83 miles per square mile.	Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry use. Manage 169 miles roads (with 980 acres of disturbance), 0.66 miles per square mile.

Table 4-28 Comparison of Impacts to Areas of Critical Environmental Concern					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Other Resources: Water Resources	Protect 2,415 acres of riparian system. Allow no restrictions on groundwater and new water developments.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Discourage groundwater and new water developments.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Allow groundwater and new water developments.	Protect 3,217 acres of riparian areas and floodplains. Encourage groundwater and new water developments to support expanded resource development.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains. Discourage groundwater and new water developments.

4.3.2. Scenic and Historic Byway

The primary goal for Scenic and Historic Byways is to cooperate with management partners to implement the corridor management plan for the Trails of the Ancients Scenic and Historic Byway. The Byway provides access to examples of Ancestral Puebloan culture and scenic vistas of Colorado Plateau geology and ecology. The management objective related to this goal is to preserve resource values while, at the same time, implementing site-specific actions in the Corridor Management Plan.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to Scenic and Historic Byways.

Beneficial impacts to byways may include impacts resulting from management actions that enhance the pristine, natural conditions that are viewed from the roadway and/or the historic values for which the roadway was designated. Adverse impacts may include impacts resulting from actions that reduce these values.

Direct impacts to byways may include the implementation of an unnatural-appearing vegetation treatment, especially if these may be seen from the byway (and thereby diminishing its scenic quality). On the other hand, managing livestock grazing for healthy native vegetation along the roadway may indirectly benefit the byway designation by maintaining scenic quality. Impacts may also include potential fluid minerals development and/or visitor services development along the byway.

4.3.2.1. Evaluation Criteria and Assumptions

In order to quantify impacts, acres of disturbance, miles of roads, and numbers of livestock can be measured. However, quantifying these impacts within the viewshed of the byway may be more difficult. Special considerations and restrictions exist for the placement of structures adjacent to Scenic Byways. Therefore, while the number of structures may increase for an alternative, placement of structures in relation to a byway may not occur. For example, Alternative IV would allow for greater fluid mineral development on current unleased land than would Alternative II. Although there may be more development, the infrastructure associated with that development may be placed away from the viewshed of the Scenic Byway.

Assumptions used in analyzing impacts to Scenic and Historic Byways include the following:

- The impacts analysis boundary for the Trail of the Ancients Scenic and Historic Byway would include the area seen in the foreground of County Road 10.
- The San Juan Skyway does not enter the Monument, but does reference the Anasazi Heritage Center as a point of interest. Therefore, this analysis pertains only to the Trail of the Ancients Scenic and Historic Byway.

4.3.2.2. Alternative Analysis

Impacts to Scenic and Historic Byways may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for Scenic and Historic Byways, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, recreation and transportation, and other resources.

Alternative I (No Action Alternative)

Scenic and Historic Byways Management

Alternative I would continue to ensure that significant cultural resources are identified and given proper consideration in advance of project-level decisions. A comprehensive Monument-wide program for the inventory, protection, and interpretation of cultural resources is not explicitly addressed in the management actions of existing plans, or those to be used under Alternative I. Although current management of public lands is required to comply with the various laws and regulations that provide protection for cultural and historical resources, this alternative, as defined in existing plans, may result in indirect impacts to cultural resources. Adverse impacts to byways may include increased visitor usage of the byways and public roads with a combination of motorized and/or non-motorized travel. This may increase the need for road maintenance, including trash pickup, infrastructure (such as signage), and law enforcement for traffic control and public safety.

Cultural Resources Management

Under Alternative I, cultural resources would continue to be developed for visiting and interpretation. As a result, there would be no change in the impacts to byways.

Fluid Minerals Management

Under this alternative, no new fluid minerals leases would be available (although existing leases would not be affected). As a result, no impacts to byways would occur.

Rangeland Resources Management

Under this alternative, management of rangeland resources would be based on permitting 8,492 AUMs. No new impacts would occur under this alternative. However, current impacts would continue.

Recreation and Transportation Management

Recreation management under this alternative would promote visitation to Lowry, Painted Hand, and Sand Canyon Pueblos. Currently, there are 149 miles of roads representing 864 acres of ground disturbance. Impacts to byways would not change under this alternative. Designated motorized access throughout the Monument generally does not present a threat to the scenic and historic byway under the current plan; however, unmanaged travel may pose a threat and this alternative would not promote the completion of a travel plan.

Other Resources Management

Visual resource management (VRM) for this alternative would discourage permanent or long-term visual intrusions to preserve scenic values, enhance viewing opportunities, and increase variety, where appropriate. Portions of the Monument with cultural resources and canyons would be managed according to Class II VRM standards. This alternative would manage 25,976 acres as VRM Class I; 139,265 acres as VRM Class II; and 94 acres as VRM Class III. Similar to all of the alternatives, the Trail of the Ancients Scenic and Historic Byway, along with a 0.5-mile buffer on either side, is assigned as VRM Class II.

Alternative II

Scenic and Historic Byways Management

This alternative would emphasize the protection of cultural resource communities, sites, and isolated finds, and would emphasize natural resource protection and enhancement. Under this beneficial landscape-scale management approach, potential direct visual impacts along the

byways may be reduced. There would be an overall reduction of total road miles available to travel throughout the Monument, which may potentially reduce resource damage. Reduced access may concentrate visitors to other areas, where more roads exist. Signage would be kept to a minimum, reducing possible visual impacts observed along the Byway.

Cultural Resources Management

Under Alternative II, the Monument would be promoted as an outdoor museum, allowing visitors to explore the objects of the Monument through a self-discovery experience. Thirteen sites would be developed for public use and interpretation. This management may direct visitors to sites accessed from the Byway, which may increase the use of the roadway, which may, in turn, result in beneficial impacts.

Fluid Minerals Management

Protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and minimize the need for site visits to any existing lease areas. No increase in infrastructure development in new lease areas would occur along the Byway. The new proposed leasing areas would be used to protect against drainage. There would be no impact to Byway management from the leasing of up to an additional 880 acres.

Rangeland Resources Management

Under Alternative II, rangeland resources would be managed to reduce conflicts between livestock grazing, and the protection of cultural resources. There would be a reduction of 2,055 active AUMs (from 8,492 active AUMs under Alternative I, to 6,437 under this alternative). The canceling of these AUMs may improve vegetation cover and land health, restore more natural conditions, and enhance the scenic quality along the Byway.

Recreation and Transportation Management

Alternative II would target local residents and incidental visitors, promoting low-impact activities. This alternative would have the greatest restrictions for motorized vehicle access throughout the Monument. Alternative II would identify and manage RMZs and SRMAs, but would add minimal facilities and infrastructure, thereby not disturbing the pristine experience of the area.

Alternative II would maintain 139 miles of roads, representing 806 acres of ground disturbance (with most existing user-created roads closed and reclaimed). Approximately 8,211 acres would be managed for public visitation with 157,124 acres managed for backcountry use. Maintaining large areas for backcountry use may minimize impacts from infrastructure, road development, and from other human influences.

Other Resources Management

This alternative would manage 38,976 acres as VRM Class I; 126,643 acres as VRM Class II; and 94 acres as VRM Class III. As with all alternatives, the Trail of the Ancients Scenic and Historic Byway, along with a 0.5-mile buffer, is assigned to VRM Class II.

Alternative III***Scenic and Historic Byways Management***

This alternative would emphasize landscape-scale cultural resource values, cultural resource communities and site protection, and natural resource protection and enhancement. Under this landscape-scale management approach, potential direct visual impacts along the Byway may be reduced due to large blocks of land being protected from ground disturbance. Under this alternative, there may be an overall increase of total road miles available to travel through the Monument, which may potentially increase usage of the Byway as visitors explore more of the

Monument. Additional informational signage would be required under this alternative, which may add to possible visual impacts observed along the Byway.

Cultural Resources Management

Under Alternative III, the Monument would be managed as an outdoor museum, allowing visitors to experience the Monument through self-discovery. In addition, 13 to 25 sites would be developed for public visitation and interpretation. More interpretive signage and resource stabilization would be added to cultural areas, which may encourage more visitors to access these areas, which may, in turn, promote the use of the Byway. Cultural resource management may result in beneficial impacts to Scenic and Historic Byways management.

Fluid Minerals Management

Under this alternative, protective measures in leased areas would include the consolidation of maintenance activities to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Under Alternative III, there would be an increase of up to 3,021 acres available for new leases. This increase in acreage available for leasing may lead to an increase in infrastructure development, which may be visually distracting to visitors when traveling along the byway.

Rangeland Resources Management

Rangeland resources would be managed to reduce conflicts between livestock grazing and protection of cultural resources. Under this alternative, there would be a minor reduction of the active AUMs (from 8,492 AUMs under Alternative I, to 8,368 under this alternative) because of closing five allotments to grazing. Closing these AUMs may improve vegetation and land health conditions in these allotments; however, the area impacted is not adjacent to any byways and, consequently, there may be no impacts.

Recreation and Transportation Management

Alternative III would identify and manage RMZs and SRMAs, adding facilities and infrastructure to support recreation and transportation. This alternative would promote visitation by regional visitors. Approximately 18,875 acres would be managed for public visitation, and 146,460 acres would be managed for backcountry use. Total road mileage would be increased from 149 miles under Alternative I, to 189 miles under this alternative, representing 1,096 acres of ground disturbance. Although some existing user-created roads would be closed and reclaimed, the overall increase in available road access may encourage the public to explore more of the Monument, using the Trail of the Ancients Scenic and Historic Byway for access to the Monument. Recreation and transportation management may result in beneficial impacts to Byways management.

Other Resources Management

This alternative would manage 25,976 acres as VRM Class I; 34,754 acres as VRM Class II; and 104,605 acres as VRM Class III. Similar to all of the alternatives, the Trail of the Ancients Scenic and Historic Byway, along with a 0.5-mile buffer, is VRM Class II.

Alternative IV

Scenic and Historic Byways Management

This alternative would emphasize the protection of cultural resource communities and sites, and natural resource values while, at the same time, encouraging resource use and development. Under this alternative, there would be an overall increase of total road miles available for travel to, and through, the Monument. This, along with an increase in developed cultural sites, may

increase the demand for use of the Byway as visitors explore more of the Monument. Additional interpretive signage would be required under this alternative, which may add to the possibility of visual impacts observed along the Byway.

Cultural Resources Management

Under Alternative IV, the Monument would be managed as an outdoor museum, allowing visitors to experience the Monument through self-discovery. In addition, 13 to 25 sites would be developed for public visitation and interpretation. Interpretive signage would be added to cultural areas, which may encourage more visitors to access these areas. This may encourage visitors to use the Byway to view these cultural sites and to explore more of the Monument, which may result in beneficial impacts.

Fluid Minerals Management

Under this alternative, protective measures in leased areas would include the consolidation of maintenance activities in order to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Under Alternative IV, there would be an increase of up to 24,462 acres available for new leases. This increase in acreage available for leasing may lead to an increase in infrastructure development along the byway, which may be visually distracting to visitors when traveling along the byway.

Rangeland Resources Management

Under this alternative, management of rangeland resources would be based on the permitting of 8,492 AUMs. No new impacts would occur under this alternative. Existing impacts may continue.

Recreation and Transportation Management

Alternative IV would identify and manage RMZs and SRMAs, and would emphasize the development of facilities and infrastructure to support recreation and transportation uses. This alternative would promote visitation by national and international visitors. Approximately 47,056 acres would be managed for public visitation, and 118,279 acres would be managed for backcountry use. No existing user-created roads would be closed. The total mileage of roads would increase from 149 miles under Alternative I, to 213 miles under Alternative IV, representing 1,235 acres of ground disturbance. This overall increase in available road access may encourage the public to explore more of the Monument, which may increase the use of the Scenic Byway for visitors going to the Monument. This may be a beneficial impact.

Other Resources Management

This alternative would manage 25,976 acres as VRM Class I; 27,535 acres as VRM Class II; 94,327 acres as VRM Class III; and 17,497 acres as VRM Class IV. As with all other alternatives, the Trail of the Ancients Scenic and Historic Byway, along with a 0.5-mile buffer, is VRM Class II.

Alternative V (Preferred Alternative)***Scenic and Historic Byways Management***

This alternative would emphasize the protection of cultural resource communities, sites, and natural resources. Under this landscape-scale management approach, potential direct visual impacts along the Byway may be reduced. The designation, clarification, and implementation of a travel plan may assist in preventing unwanted off-road travel. Managed access would concentrate visitors in areas of developed cultural resource sites and maintain the majority of the Monument in a backcountry setting. This may reduce visual impacts along the Byway while,

at the same time, requiring maintenance and infrastructure to support visiting publics. Alternative V may result in beneficial impacts.

Cultural Resources Management

Under Alternative V, the Monument would be managed as an outdoor museum, allowing visitors to experience the Monument through self-discovery. Thirteen to 25 sites would be developed for public use and interpretation. This may direct visitors to sites accessed off the Byway, which may increase the use of the roadway, which may, in turn, result in beneficial impacts.

Fluid Minerals Management

Under this alternative, protective measures in leased areas would include the consolidation of maintenance activities in order to reduce human disturbance and to minimize the need for site visits to any existing lease areas. No increase in infrastructure development in new lease areas would occur along the Byway. New proposed lease areas would be used to protect against drainage. There would be no impacts to byway usage from the leasing of up to an additional 880 acres.

Rangeland Resources Management

Under Alternative V, rangeland resources would be managed to reduce conflicts between livestock grazing, and the protection of cultural resources. There would be a reduction of 2,055 active AUMs available (from 8,492 active AUMs under Alternative I to 6,437 under this alternative). Closing these AUMs may result in beneficial impacts by improving vegetation cover and land health, restoring more natural conditions, and enhancing the scenic quality along the Byway.

Recreation and Transportation Management

Alternative V would identify and manage RMZs and SRMAs, and would promote low-impact activity with minimal facilities and infrastructure, thereby not disturbing the pristine experience of the area. This alternative would promote visitation by a mix of local residents, as well as by regional, national, and international visitors. Alternative V would maintain 169 miles of roads, representing 980 acres of ground disturbance with most existing user-created roads closed and reclaimed. Approximately 7,875 acres would be managed for public visitation, with 157,460 acres managed for backcountry use. Although most user-created roads would be closed and reclaimed, the overall increase in available road access may encourage the public to explore more of the Monument, using the Trails of the Ancients Scenic and Historic Byway as access to the Monument.

Other Resources Management

This alternative would manage 38,598 acres as VRM Class I; 126,643 acres as VRM Class II; and 94 acres as VRM Class III. As with all of the alternatives, the Trail of the Ancients Scenic and Historic Byway, along with a 0.5-mile buffer, is VRM Class II

4.3.2.3. Scenic and Historic Byway Management Impact Comparison

The Scenic and Historic Byway impact comparison is presented in Table 4-29. This table compares the consequences of resource management actions under each alternative on Scenic and Historic Byways.

4.3.2.4. Cumulative Impacts

The Trail of the Ancients Scenic and Historic Byway, along County Road 10, was established for its cultural and natural beauty. Fluid minerals development may be the most immediate threat

to maintaining the pristine character of this roadway, with potential impacts coming from already leased areas within the Monument and from neighboring private land. Furthermore, roadways in and surrounding the Monument would be used more often and, potentially, by heavier vehicles associated with mineral-development traffic. This increased use may result in a greater need for maintenance, litter clean up, and law enforcement for traffic control and public safety. The invasion of noxious weeds from offsite influences may impact vegetation along byways, compromising the natural beauty of the travel corridor, including use by wildlife. The increase in visitors to the Four Corners region may undoubtedly increase the use of Scenic and Historic Byways, regardless of actions in the Monument.

Table 4-29 Comparison of Impacts to Scenic and Historic Byway					
Land Use or Management Action	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Scenic and Historic Byways	Take no actions specific to Scenic and Historic Byways.	Implement all site-specific actions to Scenic and Historic Byways.	Implement all site-specific actions to Scenic and Historic Byway.	Implement all site-specific actions to Scenic and Historic Byways.	Implement all site-specific actions to Scenic and Historic Byways.
Cultural Resources	Develop new sites for controlled visitation.	Identify 13 sites for development.	Identify 13 to 25 sites for development.	Identify 13 to 25 sites for development.	Identify 13 to 25 sites for development.
Fluid Minerals	No Impact.	Make up to 880 acres available for new leasing.	Make up to 3,021 acres available for new leasing.	Make up to 24,462 acres available for new leasing.	Make up to 880 acres available for new leasing.
Rangeland Resources	Permit 8,492 AUMs.	Permit 6,437 AUMs.	Permit 8,368 AUMs.	Permit 8,492 AUMs.	Permit 6,437 AUMs.
Recreation and Transportation	Manage 149 miles of roads (with 864 acres of disturbance). Maintain developed recreation sites.	Manage 139 miles of roads (with 806 acres of disturbance). Manage 8,211 acres for public visitation. Manage 157,124 acres for backcountry use.	Manage 189 miles of roads (with 1,096 acres of disturbance). Manage 18,875 acres for public visitation. Manage 146,460 acres for backcountry use.	Manage 213 miles of roads (with 1,235 acres of disturbance). Manage 47,056 acres for public visitation. Manage 118,279 acres for backcountry use.	Manage 169 miles of roads (with 980 acres of disturbance). Manage 7,875 acres for public visitation. Manage 157,460 acres for backcountry use).
Other Resources: Visual Resources	Manage the Trail of the Ancients Scenic and Historic Byway as VRM Class II.	Manage the Trail of the Ancients Scenic and Historic Byway as VRM Class II.	Manage the Trail of the Ancients Scenic and Historic Byway as VRM Class II.	Manage the Trail of the Ancients Scenic and Historic Byway as VRM Class II.	Manage the Trail of the Ancients Scenic and Historic Byway as VRM Class II.

4.3.3. Research Natural Areas

The primary goal for the McElmo Research Natural Area (RNA) is to provide a natural and undisturbed setting for scientific research and public education. The management objectives related to this goal include:

- maintain and manage the McElmo RNA as a herpetological research area, a resource for educational institutions, and an outdoor classroom;
- enhance McElmo RNA surface disturbance protections;
- enhance research and outdoor educational opportunities within McElmo RNA;
- reduce livestock grazing pressure within the RNA;
- protect Potential Conservation Areas (PCAs) proposed by the Colorado Natural Heritage Program (CNHP) from adverse impacts of ground-disturbing activities; and
- evaluate the potential expansion of the RNA boundary.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to RNAs.

This section discusses impacts under each alternative of RNA management, and other key resource management alternatives on RNAs. Refer to Table 2.1 for the proposed RNA management actions under each alternative, and refer to Section 3.3.3 for a description of existing RNA conditions in the Monument.

Adverse impacts to the RNA may include any action that diminishes habitat for the long-nose leopard lizard and for other resources, particularly herpetological, in this area. Beneficial impacts may include actions that enhance the natural features of the RNA, such as its vegetation, water, and/or wildlife. Direct impacts may include the direct mortality of lizards and/or of other wildlife within the RNA. Indirect impacts may include the degradation of wildlife habitat.

4.3.3.1. Evaluation Criteria and Assumptions

Factors used to quantify impacts to the RNA include acres, miles, and/or number of AUMs that may impact the natural resources within the RNA. The number and kind of protective measures can also be used to differentiate alternatives.

Assumptions used in analyzing impacts to RNAs include the following:

- This impact analysis, for both individual and cumulative impacts, considers the spatial boundary to be the existing and/or expanded boundary of the McElmo RNA, and the temporal boundary to be the 20-year planning horizon.

4.3.3.2. Alternative Analysis

Impacts to RNAs may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for RNAs, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation management.

Alternative I (No Action Alternative)

Research Natural Areas Management

Alternative I would continue to manage the Rare Lizard and Snake Instant Study Area (ISA) as both an ACEC and a WSA. The ISA is in the same location as the McElmo RNA. The McElmo RNA would be expanded to include adjoining private land, if the proposed land exchange is completed. This may have beneficial impacts on the existing RNA due to increasing the area that would be protected for research and education. Because this action is beyond the decision ability of this plan, this alternative would only identify the 427-acre existing RNA. In addition, more intensive management of rangeland resources within the RNA, and fencing for additional management control, may have a beneficial impact to vegetation and wildlife.

Cultural Resources Management

Under this alternative, no cultural resource sites would be developed for public visitation within the RNA boundaries; therefore, there would be no impact to RNAs. Management actions that preserve and protect cultural resource sites may also protect natural resources within the RNA.

Fluid Minerals Management

There is currently an NSO stipulation for the McElmo RNA for any new leases after 1991. This management may have a beneficial impact to the RNA because it would protect wildlife and vegetation from surface-disturbing activities related to fluid minerals exploration and extraction.

Rangeland Resources Management

Under this alternative, extensive management of rangeland resources within the McElmo RNA would be required after fencing is constructed. This may have a beneficial impact to vegetation and wildlife because it would restrict livestock from sensitive areas and intensely manage them elsewhere to protect the natural and biological resources of the RNA.

Recreation and Transportation Management

Under this alternative, the two-track road leading into the RNA would remain as it currently exists, and would be open to the public. No specific recreation management plan is currently in place. This may have adverse impacts on the RNA, due to the lack of clear management direction for specific resource uses, especially if visitation increases in the future.

Alternative II

Research Natural Areas Management

The proposed expansion of the McElmo RNA under this alternative would include public land only. It would also designate the Cannonball and Sand Canyon Potential Conservation Areas (PCAs) as RNAs for a total area of 7,826 acres. This may have beneficial impacts on the existing RNA because it would increase the area protected for research and education. Expanding into adjacent private land may occur if the proposed land exchange is completed. Alternative II would maintain the Bridge Canyon NGD/NSO designation and limit road improvements. A NGD/NSO restriction would be placed on portions of the expanded RNA not currently under lease for protecting herpetological resources. By not improving roads, visitation may be limited, which may further protect these resources. Surface-disturbing activities would be limited to research and education, would prohibit seismic activity, and would close the RNA to livestock grazing. These actions may improve vegetation health and help to protect wildlife. Developing a recreation activity management plan may help guide future actions within the RNA.

Cultural Resources Management

Under this alternative, there would be no cultural resource sites developed for public visitation within the RNA boundaries; therefore, there would be no impact on the RNAs. Management actions that preserve and protect cultural resource sites may also protect natural resources within the RNA. These management actions may have a beneficial impact on RNAs because they may preserve RNA resources.

Fluid Minerals Management

There is currently an NSO stipulation for the McElmo RNA for any new leases after 1991. A NSO stipulation would be placed on portions of the expanded RNA not currently under lease for protecting herpetological resources. This management may have a beneficial impact to the RNA because it may protect wildlife and vegetation from surface-disturbing activities related to fluid minerals exploration and extraction.

Rangeland Resources Management

After fencing is completed, livestock would be removed from the McElmo RNA. This may have beneficial impacts on the vegetation and wildlife that are protected by the RNA designation.

Recreation and Transportation Management

Under this alternative, no new road development would occur within the McElmo RNA, and the existing two-track road would be closed to all traffic. This may have beneficial impacts to the RNA since it would limit access and surface-disturbing activities within the RNA. Access limitations for visitors may help preserve the important wildlife and habitat protected by the RNA designation. The RNA is currently included in the Mockingbird Mesa RMZ. This area would be managed from "Backcountry to Rural" under Alternative II, which would minimize infrastructure and development.

Alternative III**Research Natural Areas Management**

Under this alternative, the McElmo RNA would be expanded to include adjoining private land, if the proposed land exchange is completed. This may have beneficial impacts on the existing RNA because it would increase the area protected for research and education. Due to the fact that this action is beyond the decision ability of this plan, this alternative only identifies a total of 427 acres for the existing RNA. Alternative III would maintain the Bridge Canyon NSO designation, limit surface-disturbing activities to research and education, and permit seismic activity under NGD/NSO stipulations. The RNA would limit livestock grazing (allowed November 15 through March 15), develop a recreation activity management plan, and improve the access road to a natural surface. Alternative III may also have a beneficial impact on the natural, biological, and cultural resources of the Cannonball and Sand Canyon PCAs in that it would establish NGD/NSO stipulations where mineral leasing has not already occurred.

Cultural Resources Management

Under this alternative, no cultural resource sites would be developed for public visitation within the RNA boundaries; therefore, there would be no impact to RNAs. Management actions that preserve and protect cultural resource sites may also protect natural resources within the RNA. These management actions may have a beneficial impact on RNAs due to the fact that they may preserve the RNA resources.

Fluid Minerals Management

There is currently an NSO stipulation for the McElmo RNA for any new leases after 1991. This management may have a beneficial impact to the RNA because it would protect wildlife and vegetation from surface-disturbing activities related to fluid minerals exploration and extraction.

Rangeland Resources Management

Alternative III may have beneficial impacts to wildlife and vegetation in the RNA because it would limit livestock grazing opportunities to November 15 through March 15. While this alternative may have beneficial impacts, it may not be as beneficial as Alternative II (where no grazing is allowed).

Recreation and Transportation Management

Alternative III would improve the existing two-track road to a natural surface within the RNA and restrict its use for administrative purposes only. Additionally, cross-country foot traffic and horseback riding would be allowed. This management action would limit the number of visitors and help to preserve the wildlife and habitat resources protected by the RNA designation. Under Alternative III, the RNA would be managed under the Mockingbird-Mesa RMZ. This area would be managed from “Backcountry to Rural.” Improving the access to a natural surface road may increase visitation, which, in turn, may have an adverse impact to the RNA, depending on the intensity of use.

Alternative IV

Research Natural Areas Management

Under this alternative, the McElmo RNA would be expanded to include adjoining private land, if the proposed land exchange is completed. This may have beneficial impacts on the existing RNA because it would increase the area protected for research and education. Because this action is beyond the decision ability of this plan, this alternative only identifies a total of 427 acres for the existing RNA. Alternative IV would maintain the Bridge Canyon NSO designation, limit surface-disturbing activities to research and education, and permit seismic activity under NGD/NSO restrictions. The RNA management would strictly manage livestock grazing, develop a recreation activity management plan, and improve the access road to a natural surface open to the public. Alternative IV may also have a beneficial impact on the natural, biological, and cultural resources of the Cannonball and Sand Canyon PCAs because it would establish CSU stipulations where mineral leasing has not already occurred.

Cultural Resources Management

Under this alternative, there would be no cultural resource sites developed for public visitation within the RNA boundaries; therefore, there would be no impact to RNAs. Management actions that preserve and protect cultural resource sites may also protect natural resources within the RNA. These management actions may have a beneficial impact on RNAs because it may preserve RNA resources.

Fluid Minerals Management

There is currently an NSO stipulation for any new leases after 1991 within the McElmo RNA. This management may have a beneficial impact to the RNA because it would protect wildlife and vegetation from surface-disturbing activities relating to fluid minerals exploration and extraction.

Rangeland Resources Management

Under this alternative, extensive management of rangeland resources within the McElmo RNA would be required after fencing is constructed. This may have a beneficial impact to vegetation and wildlife since it would restrict livestock from sensitive areas and intensely manage them elsewhere to protect the natural and biological resources of the RNA.

Recreation and Transportation Management

Alternative IV would limit new road development and improve the existing two-track road for public use. This management action may encourage more visitors, which may, in turn, impact the preservation of wildlife and habitat resources protected by the RNA. Under Alternative IV, the RNA would be managed under the Mockingbird-Mesa RMZ. This area would be managed from “Backcountry to Rural.”

Alternative V (Preferred Alternative)***Research Natural Areas Management***

Under this alternative, the proposed expansion of the McElmo RNA would have beneficial impacts on the existing RNA because it would increase the area protected for research and education. This alternative would manage 7,826 acres as RNA. Alternative V may also have a beneficial impact on the natural, biological, and cultural resources of the Cannonball and Sand Canyon PCAs because it designates these areas as RNAs. As a result of limiting activities within the RNA, such as seismic activity and livestock grazing, there may be beneficial impacts to the vegetation and wildlife protected by the RNA. Existing NGD/NSOs for the protection of herpetological resources would be maintained, and new ones established where mineral leasing has not already occurred. In addition, by not improving the access road and keeping it open for administrative purposes only, visitation would be limited, which may further protect these resources. Alternative V would not develop a recreation activity management plan. This may have adverse impacts to vegetation and wildlife as visitation increases in the Monument.

Cultural Resources Management

Under this alternative, there would be no cultural resource sites developed for public visitation within the RNA boundaries; therefore, there would be no impact on RNAs. Management actions that preserve and protect cultural resource sites may also protect natural resources within the RNA. These management actions may have a beneficial impact on RNAs because they may preserve RNA resources.

Fluid Minerals Management

There is currently an NSO stipulation for the McElmo RNA for any new leases after 1991. In addition, stipulations to prohibit long-term, ground-disturbing fluid minerals development in the Cannonball and Sand Canyon PCAs would also be implemented. This management, including prohibiting all seismic operations, may have a beneficial impact to the RNA because it would protect wildlife and vegetation from surface-disturbing activities related to fluid minerals exploration and extraction.

Rangeland Resources Management

Alternative V may have beneficial impacts to wildlife and vegetation in the RNA because it would permit livestock grazing only from November 15 through March 15. Although this alternative may have beneficial impacts, it may not be as beneficial as Alternative II, where livestock grazing is not allowed.

Recreation and Transportation Management

Under this alternative, no new road development would occur within the McElmo RNA. Limiting new road development may have a beneficial impact to the RNA because it may limit the number of visitors and may help preserve the wildlife and habitat resources protected by the RNA. No established recreation activity management plan would be developed under this alternative, which may have adverse impacts to the RNAs since it would not plan for potential increases in visitation and associated impacts.

4.3.3.3. Research Natural Areas Management Impact Comparison

The RNA impact comparison is presented in Table 4-30. This table compares the consequences of resource management actions under each alternative on RNAs.

4.3.3.4. Cumulative Impacts

Actions may occur on adjoining private land that may negate the desire to acquire that land, as part of the RNA. Activities that result in loss of habitat and/or in direct loss to species of interest may minimize the potential of the private land to be considered for expansion into the existing RNA.

The expansion of RNA designation would add to a larger national system of lands protected for research purposes. These areas serve to protect natural conditions within them, reducing ground disturbing activities and the associated loss of wildlife habitat, possible erosion, and sedimentation into nearby water systems.

Table 4-30 Comparison of Impacts to Research Natural Areas

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
RNAs	Manage 427 acres as RNA.	Manage 7,826 acres as RNA.	Manage 427 acres as RNA.	Manage 427 acres as RNA.	Manage 7,826 acres as RNA.
Cultural Resources	Develop no cultural resource sites in RNA.	Develop no cultural resource sites in RNA.	Develop no cultural resource sites in RNA.	Develop no cultural resource sites in RNA.	Develop no cultural resource sites in RNA.
Fluid Minerals	Protect RNA through NGD/NSO.	Protect RNA through NGD/NSO. Expand RNA. Protect Cannonball and Sand Canyon units, where not currently leased.	Protect RNA through NGD/NSO.	Protect RNA through NGD/NSO.	Protect RNA through NGD/NSO. Expand RNA. Protect Cannonball and Sand Canyon units, where not currently leased.
Rangeland Resources	Apply intensive livestock management.	Close to livestock grazing.	Permit livestock grazing from November 15 to March 15.	Apply intensive livestock management.	Permit livestock grazing from November 15 to March 15.
Recreation and Transportation	Develop no recreation plan. Take no specific action for management of the two-track access road.	Develop no recreation plan. Close two-track access road.	Develop recreation plan. Manage two-track access road for administrative purposes only.	Develop recreation plan. Improve existing two-track road for public use.	Develop no recreation plan. Manage two-track access road for administrative purposes only.

4.3.4. Wild and Scenic Rivers

The primary goal for Wild and Scenic Rivers (WSRs) is to preserve free-flowing rivers with special values in their natural condition. The management objectives related to this goal is to manage rivers found suitable for WSR designation to protect their Outstandingly Remarkable Values and Classification. Currently there are no WSRs in the Monument. However, four rivers are eligible for reclassification as either scenic or recreational. These rivers include Cross Canyon, Hovenweep Tributary, Sandstone Canyon, and Bowdish Canyon. WSR review has three steps: 1) eligibility, 2) tentative classification, and 3) suitability. Wild rivers are those rivers, or sections of rivers, that are free of impoundments with watersheds and/or shorelines essentially primitive and unpolluted. These represent vestiges of primitive America. Scenic rivers are those rivers, or sections of rivers, that possess at least one outstandingly remarkable value such as geologic, historic, cultural, scenic, recreational, or other similar values. These free-flowing rivers occur throughout the Monument and all have outstanding cultural values.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to WSRs

Beneficial impacts to river segments deemed qualified as wild and scenic may include any activity that enhance the qualities of rivers that initially rendered them eligible (for example, actions that protect native riparian vegetation along the stream corridor). Adverse impacts to river segments may include any activity that reduces the characteristics that initially qualified the river (for example, impoundments would be considered a direct adverse impact).

4.3.4.1. Evaluation Criteria and Assumptions

Impacts on WSR values may come from development actions that diminish the outstandingly remarkable and free-flowing values that make the rivers eligible. These may be measured in terms of miles of stream, acres of disturbance, and/or other measures of intrusion or degradation. Often these qualities cannot be calculated.

Assumptions used in analyzing impacts to river segments deemed suitable as WSR include the following:

- Alternative II is the only alternative to assume that all river segments deemed eligible would also be considered suitable for designation as a WSR.
- Alternatives I and III through V assume that all river segments deemed eligible would not be considered suitable for designation as a Wild and Scenic River. Therefore, impacts from other resource management actions under these alternatives are not evaluated.
- The impacts analysis boundary for the WSR would include the stream in which these segments lie.
- The cumulative impacts analysis boundary for the WSR would include the drainage in which these streams lie.

4.3.4.2. Alternative Analysis

Impacts to WSRs may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions proposed for WSRs, as well as those anticipated to result from the management actions proposed for cultural resources, fluid

minerals, rangeland resources, recreation and transportation, and other resources management.

Alternative I (No Action Alternative)

Wild and Scenic Rivers Management

Under this alternative, eligibility and a tentative classification study of river segments in the Monument was completed. The BLM determined that four rivers within the Monument meet the WSR eligibility criteria, as identified in the Wild and Scenic Rivers Act. Although rivers have been determined to be eligible, under this alternative, which maintains current management, they would not be considered suitable. Therefore, there would be no impacts to WSR under this alternative.

Cultural Resources Management

There are currently no WSRs in the Monument.

Fluid Minerals Management

There are currently no WSRs in the Monument.

Rangeland Resources Management

There are currently no WSRs in the Monument.

Recreation and Transportation Management

There are currently no WSRs in the Monument.

Other Resources Management

There are currently no WSRs in the Monument.

Alternative II

Wild and Scenic Rivers Management

Designation of all four eligible river segments to the National WSR System is recommended under this alternative. Although the BLM makes recommendations for inclusion into the National WSR System, only Congress or the Secretary of the Interior (upon application by the Governor of the State), could designate a river to the National WSR System. Actual designation, if any, may or may not follow the recommendations made by the BLM.

If designated, the values that make these stream segments eligible for Congressional or administrative designation into the WSR System would be protected by management prescriptions in this plan, or in a subsequent river management plan that would limit potential surface disturbance for the 0.5 mile-wide corridor. The four rivers eligible for reclassification include Cross Canyon, Hovenweep Tributary, Sandstone Canyon, and Bowdish Canyon. A total of 25.3 free-flowing river miles that have outstanding cultural values are eligible as either scenic or recreational rivers.

Under this alternative, the BLM would not anticipate any changes to the free-flowing characteristics of these rivers, or not to the degree that they would affect eligibility/suitability. This management would have no impact.

Cultural Resources Management

Under Alternative II, the Monument would be managed as an outdoor museum, allowing visitors to experience the Monument through self-discovery. In addition, 13 sites would be developed for public visitation. This may encourage visitors to explore the Monument, but would not

change the free-flowing characteristic of the rivers to the degree that they would impact eligibility/suitability. Under this alternative, all archaeological and historic sites located within 0.25 mile from either side of the existing streambed would be considered “river-related resources” and would be protected. Visitors using these rivers may have an enhanced cultural experience in the Monument. Cultural resources management may have a beneficial impact on WSRs.

Fluid Minerals Management

Protective measures in leased areas would include the consolidation of maintenance activities in order to reduce human disturbance and to minimize the need for site visits to any existing lease areas. Under this alternative, the 880 acres considered available for leasing would be used to protect against drainage. The proposed action is not anticipated to change the free-flowing characteristics, or alter or disturb the shoreline of the rivers, to the degree that they would impact eligibility/suitability.

Rangeland Resources Management

Under Alternative II, rangeland resources would be managed to reduce conflicts between livestock grazing and the protection of cultural resources. There would be a reduction of 2,055 active AUMs available (from 8,492 active AUMs under Alternative I to 6,437 under this alternative). Additionally five allotments would be closed. The removal of these AUMs, under this alternative, would not change the free-flowing characteristic of the rivers to the degree that they would impact eligibility/suitability, or disturb the shorelines of these rivers. These actions may benefit many of the resource conditions that resulted in stream segment eligibility and suitability as WSRs.

Recreation and Transportation Management

Alternative II would promote low-impact activity, and may have the greatest restrictions for motorized vehicle access throughout the Monument. Alternative II would identify and manage RMZs and SRMAs, but would add minimal facilities and infrastructure, thereby not disturbing the pristine experience of the area. Alternative II would reduce designated access to 139 miles of roads. Most existing user-created roads would be closed and reclaimed. The decrease in mileage available to travel in the Monument would not change the free-flowing characteristic of the rivers to the degree that they would impact eligibility/suitability, or disturb or alter their shorelines.

Other Resources Management

Alternative II would protect 5,312 acres of riparian system, including canyon bottoms, riparian areas, and floodplains. Groundwater and new water developments would be discouraged. This alternative would be the most protective of water resources.

Alternative III

Wild and Scenic Rivers Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Cultural Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Fluid Minerals Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Rangeland Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Recreation and Transportation Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Other Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Alternative IV***Wild and Scenic Rivers Management***

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Cultural Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Fluid Minerals Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Rangeland Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Recreation and Transportation Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Other Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Alternative V (Preferred Alternative)***Wild and Scenic Rivers Management***

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Cultural Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Fluid Minerals Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Rangeland Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Recreation and Transportation Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

Other Resources Management

No river segments would be considered suitable for WSR designation to the National WSR System under this alternative; therefore, this alternative would have no impact.

4.3.4.3. Wild and Scenic Rivers Management Impact Comparison

The WSR impact comparison is presented in Table 4-31. This table compares the consequences of resource management actions under each alternative on Wild and Scenic Rivers.

4.3.4.4. Cumulative Impacts

The primary influence outside the Monument that may prevent current eligible and suitable stream segments from consideration as WSRs is the removal of agriculture water flows. Water runoff from irrigation occurring upstream of the Monument is the primary source of year-round water flow within the Monument and, in particular, the four stream segments being considered for designation. Given the increase in urban development (subdivisions) in fields that were used for crop production, this threat to free-flowing streams may be substantial.

Cumulative impacts from onsite and offsite fluid minerals management, livestock grazing, and/or from similar activities may potentially contaminate surface and groundwater, increase soil erosion, reduce natural vegetation cover, and proliferate noxious and invasive weeds along the four eligible WSRs. Surface disturbance may be localized to onsite river segments, but water quality issues may arise anywhere within the watershed. Impacts may be either short- or long-term, depending on their severity, and may be reduced through adequate planning, mitigation, and monitoring. Adherence to appropriate pre-development, development, and post-development protective measures may be critical to mitigate offsite and cumulative impacts.

Table 4-31 Comparison of Impacts to Wild and Scenic Rivers

Types of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Wild and Scenic Rivers	Make no WSR designations.	Consider all eligible river segments suitable as WSR (25.3 miles).	Consider no river segments suitable as WSR.	Consider no river segments suitable as WSR.	Consider no river segments suitable as WSR.
Cultural Resources	No Impact.	Protect cultural communities, sites, and isolated finds.	No Impact.	No Impact.	No Impact.
Fluid Minerals	No Impact.	Make up to 880 acres available for leasing, with an NSO/NGD stipulation.	No Impact.	No Impact.	No Impact.
Rangeland Resources	No Impact.	Manage 6,437 AUMs.	No Impact.	No Impact.	No Impact.
Recreation and Transportation	No Impact.	Reduce road miles (139 miles).	No Impact.	No Impact.	No Impact.
Other Resources: Water Resources	No Impact.	Protect 5,312 acres of canyon bottoms, riparian areas, and floodplains.	No Impact.	No Impact.	No Impact.

4.3.5. Wilderness Study Areas

The primary goals for Wilderness Study Areas (WSAs) are to determine management guidance, should Congress release them from WSA status. The management objectives related to this goal include:

- maintain the non-impairment standard for WSAs, in accordance with the FLPMA, in order to prevent undue and unnecessary degradation of wilderness characteristics; and
- protect and preserve wilderness characteristics, where appropriate (i.e., their “naturalness”, their outstanding opportunities for solitude, and their potential for primitive and unconfined recreation) in citizens wilderness proposal areas located outside WSAs.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to WSAs.

Beneficial impacts may include activities that enhance wilderness qualities and/or provide protection for wilderness characteristics. Adverse impacts may include any activity that diminishes the wilderness quality of WSAs. Direct impacts may include such actions as the construction of a road or a well pad. Indirect impacts may include such actions that might result from over-grazing and/or from erosion.

4.3.5.1. Evaluation Criteria and Assumptions

Numerous restrictions and stipulations exist that maintain the integrity of existing WSAs, which significantly reduces impacts.

Assumptions used in analyzing impacts to WSAs include the following:

- This impact analysis considers the spatial boundary the existing boundary of the WSAs, and the temporal boundary the 20-year planning horizon.

4.3.5.2. Alternative Analysis

Impacts to WSAs may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for WSAs, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)

Wilderness Study Areas Management

Alternative I would use the no-impairment standards from the FLPMA and from the BLM's Interim Management Policy to Manage WSAs and would provide opportunities for backcountry recreation (e.g., hiking, dispersed camping, horseback riding). The BLM would preserve these areas (25,549 acres) as suitable for wilderness until they are reviewed and acted upon by Congress. Patrolling WSAs may help prevent any misuse or impairment of these wilderness areas. Providing opportunities for backcountry recreation would allow access to and enjoyment of these areas while, at the same time preserving the natural landscape.

Cultural Resources Management

Under Alternative I, no cultural resource sites would be developed for public visitation within the WSA boundaries. Additional management actions would preserve and protect cultural resource

sites, and provide research, interpretation, and education opportunities. These management actions may have a beneficial impact on WSAs.

Fluid Minerals Management

Under Alternative I, there would be no new leasing of fluid minerals within the existing WSAs; therefore, there would be no impact from fluid minerals management on WSAs.

Rangeland Resources Management

Under this alternative, there would be no specific livestock management actions related to WSAs. This alternative may have adverse impacts to WSAs because there would be no changes to the current management, which includes 8,492 AUMs. This may adversely impact areas within the WSAs that are currently not achieving Public Land Health Standards or PFC. Several areas within the WSAs have been identified as Functional-At Risk with a downward trend. Without more restrictive rangeland management, it is unlikely that improvements would occur to resource conditions for soil, vegetation, habitat, and/or to water quality within these areas.

Recreation and Transportation Management

Under Alternative I, there would be no development of additional roads within WSA boundaries; therefore, there would be no impacts from transportation management actions on WSAs.

Providing backcountry recreation (e.g., hiking, dispersed camping, horseback riding) would allow public access to, and enjoyment of, these areas, while, at the same time, preserving the natural landscape. This alternative does not have a marketing strategy for tourism; therefore, it would not increase visitation through agency promotion.

Alternative II

Wilderness Study Areas Management

Alternative II would manage the citizen's proposed expansion of the WSAs, along with existing WSAs, for wilderness characteristics (30,772 acres). If Congress releases the WSAs from designation, management of these areas would remain consistent with non-impairment standards.

Alternative II would further manage released WSAs by removing unnecessary fencing and non-domestic water developments, preventing the construction of new fences and water-related developments, and establishing NGO/NSO restrictions. These actions may have beneficial impacts on the resources of all areas with wilderness characteristics. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. In addition, management actions for WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife.

Management of the citizen's proposed expansion for WSAs may have beneficial impacts to existing WSAs because this would increase the area of protection for natural, biological, and aesthetic resources. However, because much of the citizen's proposed expansion area is already leased for fluid minerals, only those stipulations in place at the time of leasing could apply. The establishment of NGO/NSO restrictions within existing WSAs and unleased areas managed for wilderness characteristics may have beneficial impacts to vegetation, wildlife, and cultural resources because they would limit ground-disturbing activities that may adversely impact these resources.

Cultural Resources Management

Under Alternative II, no cultural resource sites would be developed for public visitation within the WSA boundaries. Additional management actions would preserve and protect cultural resource sites, and provide research, interpretation, and education opportunities. These management actions may have a beneficial impact on WSAs since they would provide education about the cultural and natural history of the Monument.

Fluid Minerals Management

Under Alternative II, adverse impacts on existing and expanded WSAs may occur, except where NSO stipulations apply. The citizen has proposed expansion area would be managed with existing stipulations where leases already exist. This may result in impacts to wilderness characteristics. Areas not currently leased would be managed with NSO stipulations that protect wilderness qualities.

Rangeland Resources Management

As previously discussed, removing unnecessary fencing and/or non-domestic water-related developments and preventing the construction of these features may have beneficial impacts on the natural, biological, and aesthetic resources of WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. Management actions for WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife. In addition, by implementing lower stocking levels (6,437 AUMs), spring use restrictions, and stricter utilization standards, there may be beneficial impacts to WSAs because of the improvement in land health conditions, including in soil, vegetation, wildlife habitat, and water quality.

Recreation and Transportation Management

Under Alternative II, there would be no development of additional roads within the WSA boundaries; therefore, there would be no impacts from transportation management actions on WSAs. Alternative II would limit recreational activities, such as camping, campfires, rock climbing, and target shooting in the Monument. Due to the remoteness of the WSAs, limited use may occur because of the no-camping restriction. This alternative would promote an undeveloped recreation strategy, marketing primarily to local residents and incidental visitors.

Alternative III

Wilderness Study Areas Management

Alternative III would not include the citizen's proposed expansion of WSA. This alternative would manage existing WSAs for wilderness characteristics (25,549 acres). If Congress releases the WSAs from their designation, these areas would continue to be managed for wilderness characteristics. However, minimal development would be allowed for research purposes.

Removing unnecessary fencing and/or non-domestic water-related developments, and limiting construction of these features may have beneficial impacts on the natural, biological, and aesthetic resources of the WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbances, as well as the restoration of habitat connectivity. In addition, management actions for WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife. By limiting the construction of new fences and water-related developments, in order to further enhance the wilderness values, there may be a beneficial impact to WSAs due to improved ecological

conditions. Similarly, establishing NGO/NSO restrictions that protect areas with wilderness characteristics and permitting ground-disturbing activities only when necessary for research purposes may further protect the natural, biological, and aesthetic resources of the WSAs.

Cultural Resources Management

Under Alternative III, there would be no cultural resource sites developed for public visitation within the WSA boundaries. Additional management actions would preserve and protect cultural resource sites, and provide research, interpretation, and education opportunities. These management actions may have a beneficial impact on WSAs.

Fluid Minerals Management

Under Alternative III, adverse impacts to existing and expanded WSAs may occur, except where NSO stipulations apply.

Rangeland Resources Management

Removing unnecessary fencing and/or non-domestic water-related developments would have beneficial impacts on the natural, biological, and aesthetic resources of WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbances, as well as the restoration of habitat connectivity. By limiting the construction of new fences and water-related developments, in order to further enhance wilderness values, there may be a beneficial impact to WSAs due to improved ecological conditions. Management actions for WSA-appropriate range improvements may have beneficial impacts because they may improve habitat for both livestock and wildlife. Although stock levels would remain the same as those proposed under Alternative I, spring use restrictions and stricter utilization standards would be implemented. This may have beneficial impacts on WSAs because they may improve land health conditions, including soil, vegetation, wildlife habitat, and water quality. This improvement may be slower to occur than under Alternative II, where AUM allocations match calculated capacity. This alternative permits 8,368 AUMs.

Recreation and Transportation Management

Under Alternative III, there would be no development of additional roads within the WSA boundaries; therefore, there would be no impacts from the transportation management actions on WSAs. Under Alternative III, camping would be permitted within the Squaw and Cross Canyons WSAs. This would allow public access to, and enjoyment of, these areas while, at the same time, preserving the natural landscape. This alternative would promote the Monument as a destination for regional visitors. This may increase visitation to the backcountry.

Alternative IV***Wilderness Study Areas Management***

Alternative IV would manage the existing WSAs for wilderness characteristics (25,549 acres). If Congress releases WSAs from their designation, these areas would continue to be managed for wilderness characteristics; however, minimal development would be allowed for research, recreation, interpretation, fuels and fire management, rangeland, and vegetation manipulation for wildlife habitat.

Removing unnecessary fencing and/or non-domestic water-related developments, and limiting construction of these features may have beneficial impacts on the natural, biological, and aesthetic resources of the WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. In addition, management actions for WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife. By limiting

the construction of new fences and water-related developments, in order to further enhance the wilderness values, there may be a beneficial impact to WSAs due to improved ecological conditions. Similarly, establishing NGO/NSO restrictions that protect areas with wilderness characteristics and permitting ground-disturbing activities only when necessary for research purposes may further protect the natural, biological, and aesthetic resources of the WSAs.

Cultural Resources Management

Under Alternative IV, there would be no cultural resource sites developed for public visitation within the WSA boundaries. Additional management actions would preserve and protect cultural resource sites, and provide research, interpretation, and education opportunities. These management actions may have a negligible, beneficial impact on WSAs.

Fluid Minerals Management

Under Alternative IV, adverse impacts on existing and expanded WSAs may occur, except where NSO restrictions apply.

Rangeland Resources Management

Removing unnecessary fencing and/or non-domestic water-related developments may have beneficial impacts on the natural, biological, and aesthetic resources of the WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. On the other hand, by allowing the construction of new fences and water-related developments, there may be a beneficial impact to WSAs due to improved ecological conditions. In addition, management actions for WSA-appropriate range improvements may have beneficial impacts by improving habitat for both livestock and wildlife.

Under this alternative, there would be no change in livestock levels compared with Alternative I; however, more intensive livestock management would occur. Concern for land health conditions would continue, but such conditions may be expected to improve, which may benefit soil, vegetation, wildlife habitat, and water quality within WSAs. Improvement may be slower to occur than under Alternative II, where AUM allocations match calculated capacity. This alternative permits 8,492 AUMs.

Recreation and Transportation Management

Under Alternative IV, there would be no roads developed within the boundaries of the WSA; however, there would be two roads developed for public access by foot or by horse. Depending on the extent of use, there may be the potential for adverse impacts. These impacts may be small, however, due to the fact that access would be limited to non-motorized use. Under Alternative IV, camping would be permitted within the Squaw and Cross Canyon WSAs. This would allow public access to, and enjoyment of, these areas while, at the same time, preserving the natural landscape. This alternative would promote the Monument as a destination for national and international visitors, which may increase visitation to the backcountry.

Alternative V (Preferred Alternative)

Wilderness Study Areas Management

Alternative V would manage the citizen's proposed expansion of WSAs, along with existing WSAs, for wilderness characteristics (30,772 acres). If Congress releases the WSAs from designation, management of these areas would remain consistent with non-impairment standards.

Ground-disturbing activities would be allowed on a site-specific basis for research, recreation, rangeland management, fuels and fire management, and vegetation manipulation for wildlife habitat. Removing unnecessary fencing and/or non-domestic water-related developments, and limiting construction of these features may have beneficial impacts on resources of the WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. On the other hand, Monument Manager's discretion to allow WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife. By allowing the construction of new fences and water-related developments, there may be a beneficial impact to WSAs due to improved ecological conditions.

Management of the citizen's proposed expansion for WSAs may have beneficial impacts to existing WSAs due to the fact that this would increase the area to preserve the natural, biological, and aesthetic resources of the WSAs. However, because much of the citizen's proposed expansion area is already leased for fluid minerals, only those stipulations in place at the time of leasing would apply. The establishment of NGO/NSO restrictions within existing WSAs and unleased areas proposed for WSA expansion may have beneficial impacts to vegetation, wildlife, and cultural resources due to the fact that they would limit ground-disturbing activities that may adversely impact these resources.

Cultural Resources Management

Under Alternative V, no cultural resource sites would be developed for public visitation within WSA boundaries. Management actions that protect natural resources would preserve and protect cultural resource sites, and provide research, interpretation, and education opportunities. These management actions may have a beneficial impact on WSAs.

Fluid Minerals Management

Under Alternative V, possible impact on existing and expanded WSAs may occur, except where NSO/NGD stipulations apply. The citizen's proposed expansion area would need to be managed with existing stipulations where leases already exist. This may result in adverse impacts to wilderness characteristics. Areas of new leases would be managed with NSO/NGD stipulations in order to protect wilderness qualities.

Rangeland Resources Management

Removing unnecessary fencing and/or non-domestic water-related developments may have beneficial impacts on the natural, biological, and aesthetic resources of the WSAs. Beneficial impacts to wildlife and vegetation may include the reduction of barriers and habitat disturbance, as well as the restoration of habitat connectivity. By limiting the construction of new fences and water-related developments, in order to further enhance the wilderness values, there may be a beneficial impact to WSAs due to improved ecological conditions. In addition, management actions for WSA-appropriate range improvements may have beneficial impacts due to the fact that they may improve habitat for both livestock and wildlife.

In addition, by implementing lower stocking levels (6,437 AUMs), spring use restrictions, and stricter utilization standards, there may be beneficial impacts to WSAs due to the fact that they may improve land health conditions, including soil, vegetation, wildlife habitat, and water quality.

Recreation and Transportation Management

Under Alternative V, there would be no development of additional roads within the WSA boundaries; therefore, there would be no impacts from transportation management actions on WSAs. Alternative V would allow camping and campfires within the WSA, but would prohibit geocaching and target shooting. Rock climbing would be in designated sites only and would not

occur within a WSA. This would allow public access to, and enjoyment of, these areas while, at the same time, preserving the natural landscape. This alternative would promote specific sites in the Monument as destinations for regional, national, and international visitors. Most of the Monument, however, would be managed for undeveloped recreation, targeting local residents and incidental visitors.

4.3.5.3. Wilderness Study Areas Management Impact Comparison

The WSA impact comparison is presented in Table 4-32. This table compares the consequences of resource management actions under each alternative on WSAs.

4.3.5.4. Cumulative Impacts

Factors outside the Monument that may impact WSAs, as well as areas with wilderness characteristics, include the spread of noxious weeds, the reduction of water flows from upstream agriculture operations, the development of neighboring private land (and the associated noise and/or ridgeline construction), the increased visitation to the local region through tourism marketing, the loss of air quality, and the increased fly-over traffic from aircrafts. Any activity that can be detected by any human sense may impact a person's wilderness experience. For example, the placement of an oil well on neighboring private land may send fumes and odors into the WSA, if wind direction allows. Increased traffic on roads adjacent to WSAs may result in increased noise levels within WSAs. In general, the more people and development in the area, the more chance of impacts to wilderness characteristics. Any one of these impacts may affect a person's wilderness experience at any given moment. However, the cumulative impact of several of these factors may negate the wilderness experience over a long period of time, if not permanently.

Table 4-32 Comparison of Impacts to Wilderness Study Areas

Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
WSAs	Manage 25,549 acres as WSA,	Manage 25,549 acres as WSA. Manage an additional 5,223 acres for wilderness character.	Manage 25,549 acres as WSA.	Manage 25,549 acres as WSA.	Manage 25,549 acres as WSA. Manage an additional 5,223 acres for wilderness character.
Cultural Resources	No Impact.	No Impact.	No Impact.	No Impact.	No Impact.
Fluid Minerals	No Impact.	Apply NSO stipulations on existing WSAs and on expanded WSA where leasing does not already occur.	Apply NSO stipulations on existing WSAs.	Apply NSO stipulations on existing WSAs.	Apply NSO stipulations on existing WSAs and on expanded WSA where leasing does not already occur.
Rangeland Resources	Permit 8,492 AUMs. Allow no new fencing or water developments.	Permit 6,437 AUMs. Rarely allow new fencing and water developments.	Permit 8,368 AUMs. Rarely allow new fencing and water developments.	Permit 8,492 AUMs. Manager's discretion to allow new fencing and water developments to improve WSA values.	Permit 6,437 AUMs. Manager's discretion to allow new fencing and water developments to improve WSA values.
Recreation and Transportation	Allow camping and campfires. Promote no specific recreation strategy.	Allow no camping or campfires. Promote undeveloped strategy for local residents.	Allow camping and campfires. Promote destination strategy for regional visitors.	Allow camping and campfires allowed. Promotes a destination strategy for national and international visitors.	Allow camping and campfires. Promotes a mix of strategies.

4.3.6. Public Safety and Law Enforcement

The primary goal of public safety and law enforcement goal is to provide for public safety and for enforcement of Federal laws and regulations related to the Monument and its resources. The management objectives related to this goal include:

- address law enforcement strategies recommended in existing Monument Law Enforcement Plan including:
- hazardous waste public safety;
- drug and controlled substances; and
- unauthorized use and development of Monument lands, resources, and objects;
- provide appropriate law enforcement training for specific Monument resources and objects; and
- maintain coordination with other agencies and jurisdictions for fire control, emergency response, and Search and Rescue functions.

The five alternatives represent different combinations of management actions and land use or resource development scenarios, each with differing types and levels of impacts. The following alternative analysis considers adverse and beneficial impacts, direct and indirect impacts, as well as short-term and long-term impacts related to public safety and law enforcement.

Direct impacts to public safety and law enforcement may include visitation and vandalism without adequate facilities and personnel to manage such issues. Indirect beneficial impacts may include increased signage; safe roads; clear easily obtainable travel maps; more law enforcement initiatives, including hotline numbers; and greater public awareness of what to look for and how to report violations.

4.3.6.1. Evaluation Criteria and Assumptions

Quantifying individual impacts to public safety and law enforcement can be indirectly determined by measures of road miles, number of sites developed for visitation, and marketing strategies.

Assumptions used in analyzing impacts to public safety and law enforcement resource uses include the following:

- Federal lands within the boundary of the Monument were used as the impacts analysis area.
- Cumulative impacts were examined in relation to trends within Dolores and Montezuma Counties.

4.3.6.2. Alternative Analysis

Impacts to public safety and law enforcement may differ in extent and severity, depending on the specific management actions under each alternative. The following sections describe the impacts under each alternative anticipated to result from the management actions directly proposed for public safety and law enforcement, as well as those anticipated to result from the management actions proposed for cultural resources, fluid minerals, rangeland resources, and recreation and transportation.

Alternative I (No Action Alternative)***Public Safety and Law Enforcement Management***

Alternative I management actions would include continued cooperation with the National Park Service Stabilization Unit at Mesa Verde National Park, and increasing patrol efforts in cultural resource areas using two full-time seasonal law enforcement rangers. These actions may result in beneficial impacts to public safety.

Under this alternative, the BLM would provide intensive protection of cultural resources from vandals and pothunters through increased surveillance and law enforcement. In addition, close coordination with other local law enforcement personnel, as well as opportunities for contracting law enforcement with county sheriffs would be explored. Periodic aircraft flights and ground and vehicle patrols would be used year-round to reduce and/or to prevent pothunting. Patrol activity would be complemented by public education and awareness programs, conducted in cooperation with the AHC. These actions may result in beneficial impacts to public safety and law enforcement due to the increased cooperation with other law enforcement personnel. Air patrols of Monument resources may further protect public safety and Monument resources.

Cultural Resources Management

This alternative would call for the stabilization, and possible development of up to 240 sites. Cultural resource patrols would be managed as a component of other resource protection activities, which may result in beneficial impacts.

Fluid Minerals Management

Under this alternative, no new wells would be drilled, which would reduce the number of workers accessing Monument roads and resources; therefore, there may be no impacts from fluid minerals management.

Rangeland Resources Management

Under Alternative I, enforcement actions would be taken against trespassers grazing illegal livestock in the Monument. In addition, applicable permit laws and regulations would apply. This action may result in beneficial impacts due to increased protection of Monument resources.

Recreation and Transportation Management

Under Alternative I, recreation management would include developing facilities on an as-needed basis, and maintaining developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos. No new SRPs would be issued.

Under this alternative, the Monument travel system would include 149 miles (864 acres) of roads for motorized, mechanized, and/or for non-motorized use. Cross-country motorized and mechanized travel would be prohibited. No new roads would be built because of new fluid minerals leasing. No BLM marketing strategy for tourism would occur; therefore, Monument visitation may continue to be dominated by local residents and incidental visitors.

Other Resources Management

The management goals and actions for other resources (fuels and fire, geologic, facilities and infrastructure, and lands and realty), although not specifically addressing public safety and law enforcement, may provide beneficial impacts to public safety and law enforcement.

Alternative II

Public Safety and Law Enforcement Management

Alternative II management actions would include increasing patrols during seasonal permit activities at recreation sites during spring breaks and holidays, and in areas experiencing high levels of cross-country travel. Management would also include developing a protocol to identify, respond to, and remove hazardous materials. Additional management actions that may result in greater public safety and protection of Monument resources include cooperating with other law enforcement entities to:

- provide training of, and updates to, personnel conducting patrols during periods with high or extreme fire danger;
- prevent and investigate human-caused fires and suspicious wildland fires;
- assist SAR teams and emergency medical services;
- participate in training;
- enforce Monument laws, regulations, and policies; and
- create a protocol for reporting resource management violations.

Cultural Resources Management

Under this alternative, the BLM would establish cultural resource vandalism, trespassing, and human remains discovery reporting and investigation procedures and protocols between the Dolores Field Office, AHC/Monument staff, the BLM law enforcement rangers, and local law enforcement agencies. The BLM would also ensure that these archaeology and law enforcement personnel maintain current training in investigation and case preparation, in accordance with the requirements of the Archaeological Resources Protection Act of 1979 (ARPA). These actions may result in beneficial impacts due to the fact that they may allow law enforcement personnel to operate more efficiently and effectively. Thirteen cultural resource sites would be developed for public visitation under this alternative.

Fluid Minerals Management

Under Alternative II, up to 880 acres would be available for leasing to protect against drainage. Up to a total of 18 acres of new ground disturbance would be possible under this alternative. Additional infrastructure, including roads and utilities, as well as offsite infrastructure, would be required for fluid minerals development. Under Alternative II, two new well pads would be anticipated. This alternative may slightly increase traffic, as well as the chance for toxic spills, which may impact public safety.

Rangeland Resources Management

Under Alternative II, enforcement actions would be taken against trespassers grazing illegal livestock in the Monument. In addition, applicable permit laws and regulations would apply. This action may result in beneficial impacts due to increased protection of Monument resources.

Recreation and Transportation Management

Under Alternative II, recreation management would include managing for custodial purposes, user conflicts, visitor safety, and/or for resource protection. Developed sites at Lowry, Painted Hand, and Sand Canyon Pueblos would be maintained. Approximately 8,211 acres would be managed as visitation areas, and 157,124 acres would be managed as backcountry areas. No new SRPs would be issued, and existing SRPs would be allowed to expire.

Under this alternative, the Monument travel system would include 139 miles (806 acres) of roads for motorized, mechanized, and/or for non-motorized use. There would be no roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited, and law enforcement efforts to maintain this would be critical.

This alternative would require the closure of all user-created roads, as well as other more established roads. Managing the public so that they would not use closed roads would involve education and law enforcement efforts. This alternative may require more enforcement efforts, for this reason, than would any other alternative.

Alternative III

Public Safety and Law Enforcement Management

Alternative III management actions would include increasing patrols during seasonal permit activities and at recreation sites during spring breaks and holidays, and in areas experiencing high levels of cross-country travel. It would also include developing a protocol to identify, respond to, and remove hazardous materials. Additional management actions that may benefit public safety and the protection of Monument resources include cooperating with other law enforcement entities to:

- provide training of, and updates to, personnel conducting patrols during periods with high or extreme fire danger;
- prevent and investigate human-caused fires and suspicious wildland fires;
- assist SAR teams and emergency medial services;
- participate in training;
- enforce Monument laws, regulations, and policies; and
- create a protocol for reporting resource management violations.

Cultural Resources Management

Under this alternative, the BLM would establish cultural resource vandalism, trespassing, and human remains discovery reporting and investigation procedures and protocols between the Dolores Field Office, AHC/Monument staff, the BLM law enforcement rangers, and local law enforcement agencies. The BLM would also ensure that their archaeology and law enforcement personnel maintain current training in investigation and case preparation, in accordance with the requirements of ARPA. Additionally, under Alternative III, access to most sites would not be encouraged. These actions may result in beneficial impacts to public safety and law enforcement because reduced access to sites may increase public safety and Monument resource preservation. Thirteen to 25 cultural resource sites would be developed for public visitation under this alternative.

Fluid Minerals Management

Under Alternative III, up to 3,021 acres would be available for leasing. Up to a total of 73 acres of new ground disturbance associated with eight new well pads would be possible under this alternative. This management may result in adverse impacts to public safety due to increased traffic and the potential for toxic spills.

Rangeland Resources Management

Under Alternative III, law enforcement actions would be taken against trespassers grazing illegal livestock in the Monument. In addition, applicable permit laws and regulations would apply. This action may result in beneficial impacts due to increased protection of Monument resources.

Recreation and Transportation Management

Under Alternative III, recreation management would include a destination management strategy for regional visitors, actively marketing communities in the Four Corners area. Promoting the Monument regionally may draw more people to the area, which, in turn, may require greater education and law enforcement efforts to protect the objects of the Monument. Specific public access points and appropriate support facilities would be provided. Approximately 18,875 acres would be managed as visitation areas, and 146,460 acres would be managed as backcountry areas. No new SRPs would be issued, and existing SRPs could be renewed. The Monument travel system would include 189 miles (1,096 acres) of roads for motorized, mechanized, and/or for non-motorized use. There would be roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and/or mechanized travel would be prohibited. Maintaining a variety of segregated use roads may require education and enforcement.

Alternative IV

Public Safety and Law Enforcement Management

Alternative IV management actions would increase patrols during seasonal permit activities and at recreation sites during spring breaks and holidays, and in areas experiencing high levels of cross-country travel. It would also include developing a protocol to identify, respond to, and remove hazardous materials. Additional management actions that may benefit public safety and Monument resources include cooperating with other law enforcement entities to:

- provide training of, and updates to, personnel conducting patrols during periods with high or extreme fire danger;
- prevent and investigate human-caused fires and suspicious wildland fires;
- assist SAR teams and emergency medical services;
- participate in training;
- enforce Monument laws, regulations, and policies; and
- create a protocol for reporting resource management violations.

Cultural Resources Management

Under this alternative, the BLM would establish cultural resource vandalism, trespassing, and human remains discovery reporting and investigation procedures and protocols between the Dolores Field Office, AHC/Monument staff, the BLM law enforcement rangers, and local law enforcement agencies. The BLM would also ensure that their archaeology and law enforcement personnel maintain current training in investigation and case preparation, in accordance with the requirements of ARPA. Additionally, under Alternative IV, access to most sites would be encouraged. These actions may result in adverse impacts to public safety and law enforcement due to the fact that access to sites may decrease public safety and Monument resource preservation. Thirteen to 25 cultural resource sites would be developed for public visitation under this alternative.

Fluid Minerals Management

Under Alternative IV, up to 24,462 acres would be available for leasing and would involve up to 59 new well pads and up to 19 miles of roads. Under Alternative IV, new oil and gas leases would have NSO stipulations that protect cultural, natural, and scenic resources and Monument objects. Up to a total of 447 acres of new ground disturbance would be possible under this alternative. This management may result in adverse impacts to public safety due to the fact that additional development may increase traffic and the potential for toxic spills.

Rangeland Resources Management

Under Alternative IV, enforcement actions would be taken against trespassers grazing illegal livestock in the Monument. In addition, applicable permit laws and regulations would apply. This action may result in beneficial impacts due to increased protection of Monument resources.

Recreation and Transportation Management

Under Alternative IV, recreation management would include a destination management strategy, including establishing destinations for national and international visitors, providing specific public access points, visitor facilities, access, and/or appropriate support facilities. Approximately 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. New SRPs would be issued on a case-by-case basis.

Under this alternative, the Monument travel system would include 213 miles (1,235 acres) of roads for motorized, mechanized, and/or for non-motorized use. There would be roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited.

Alternative V (Preferred Alternative)**Public Safety and Law Enforcement Management**

Alternative V management actions would include increasing patrols during seasonal permit activities and at recreation sites during spring breaks and holidays, and in areas experiencing high levels of cross-country travel. It would also include developing a protocol to identify, respond to, and remove hazardous materials. Additional management actions that may benefit public safety and Monument resources include cooperating with other law enforcement entities to:

- provide training, of and updates to, personnel conducting patrols during periods with high or extreme fire danger;
- prevent and investigate human-caused fires and suspicious wildland fires;
- assist SAR teams and emergency medical services;
- participate in training;
- enforce Monument laws, regulations, and policies; and
- create a protocol for reporting resource management violations.

Cultural Resources Management

Under this alternative, the BLM would establish cultural resource vandalism, trespassing, and human remains discovery reporting and investigation procedures and protocols between the Dolores Field Office, AHC/Monument staff, the BLM law enforcement rangers, and local law enforcement agencies. The BLM would also ensure that their archaeology and law enforcement personnel maintain current training in investigation and case preparation, in accordance with the

requirements of ARPA. Additionally, under Alternative V, access to most sites would not be encouraged. These actions may result in beneficial impacts to public safety and law enforcement due to the fact that reduced access to sites may increase public safety and Monument resource preservation. Thirteen to 25 cultural resource sites would be developed for public visitation under this alternative.

Fluid Minerals Management

Under Alternative V, up to 880 acres would be available for leasing to protect against drainage. A total of 18 acres of new ground disturbance would be possible under this alternative. Additional infrastructure, including roads and utilities, as well as offsite infrastructure may be required for fluid minerals development. Up to two new well pads would be anticipated. This alternative may slightly increase the potential for impacts to public safety due to increased traffic and the potential for toxic spills.

Rangeland Resources Management

Under Alternative V, enforcement actions would be taken against trespassers grazing illegal livestock in the Monument. In addition, applicable permit laws and regulations would apply. This action may result in beneficial impacts due to increased protection of Monument resources.

Recreation and Transportation Management

Under Alternative V, recreation management would include a combination of strategies. Undeveloped areas with minimal facilities would be combined with destination management strategies for Painted Hand and Sand Canyon Pueblos, the AHC, and Lowry Pueblo RMZs. 47,056 acres would be managed as visitation areas, and 118,279 acres would be managed as backcountry areas. Up to 10 new SRPs would be issued.

Under this alternative, the Monument travel system would include 169 miles (980 acres) of roads for motorized, mechanized, and/or for non-motorized use. There would be roads specifically designated for OHV, mountain bike, or dirt bike travel. These forms of travel would be allowed on roads designated as open to all forms of travel. Cross-country motorized and mechanized travel would be prohibited. Maintaining a variety of segregated use roads may require education and law enforcement.

4.3.6.3. Public Safety and Law Enforcement Management Impact Comparison

The public safety and law enforcement impact comparison is presented in Table 4-33. This table compares the consequences of resource management actions under each alternative on public safety and law enforcement.

4.3.6.4. Cumulative Impacts

Cumulative impacts on public safety and law enforcement management may include enhanced safety and response due to cooperation with other Federal, State, county, and local law enforcement entities. The increased numbers of local residents and visiting publics may increase the need for public safety and law enforcement throughout the region. This may also be true for increased oil and gas development. These developments may occur both on and off the Monument, and may result in more traffic.

Table 4-33 Comparison of Impacts to Public Safety and Law Enforcement					
Type of Land Use or Management	Alternative I (No Action Alternative)	Alternative II	Alternative III	Alternative IV	Alternative V (Preferred Alternative)
Public Safety and Law Enforcement	Add additional rangers.	Add additional rangers. Promote greater cooperation, more efficient use of resources.	Add additional rangers. Promote greater cooperation, more efficient use of resources.	Add additional rangers. Promote greater cooperation, more efficient use of resources.	Add additional rangers. Promote greater cooperation, more efficient use of resources.
Cultural Resources	Develop new sites for controlled visitation. Protect cultural sites.	Develop 13 sites. Protect cultural communities, sites, and isolated finds.	Develop 13 to 25 sites. Protects cultural communities and sites.	Develop 13 to 25 sites. Protect cultural communities and sites.	Develop 13 to 25 sites. Protect cultural communities and sites.
Fluid Minerals	No Impact.	Make up to 880 acres available for leasing.	Make up to 3,021 acres available for leasing.	Make up to 24,462 acres available for leasing.	Make up to 880 acres available for leasing.
Rangeland Resources	Take action against trespassers. Permit 8,492 AUMs.	Take action against trespassers. Permit 6,437 AUMs.	Take action against trespassers. Permit 8,368 AUMs.	Take action against trespassers. Permit 8,492 AUMs.	Take action against trespassers. Permit 6,437 AUMs.
Recreation and Transportation	Manage 149 miles roads. Promote no specific recreation strategy.	Manage 139 miles roads. Promotes undeveloped strategy for local residents.	Manage 189 miles roads. Promotes a destination strategy for regional visitors.	Manage 213 miles roads. Promote a destination strategy for national and international visitors.	Manage 169 miles roads. Promote a mix of strategies.

4.4. Social and Economic Conditions

4.4.1. Introduction

For this DRMP/DEIS, potential social and economic impacts were analyzed by comparing an economic and social baseline scenario predicted for the study area over the 20-year planning period against changes to this baseline that may be expected to result from different planning alternatives. The baseline scenario was developed from a forecast created by Colorado’s State Office of Demography and the Bureau of Economic Analysis (BEA 2007). This scenario establishes how the socioeconomic study area is expected to change over the next 20 years, given current economic and social trends for the local area, Four Corners region, Colorado, and the western United States. The analysis is based on the assumption that this predicted baseline for the study area would result under continuation of current management (and subsequent trends), on Alternative I, the No Action Alternative. Therefore, this baseline scenario is described in the following discussion of Alternative I impacts.

4.4.2. Economic Impact Analysis

In the economic impact analysis, management actions for the key planning issues (e.g., cultural resources, fluid minerals, rangeland resources, and recreation/transportation) are linked to one of the base industries (e.g., mining, agriculture, tourism) in order to estimate potential impacts to employment and income in Montezuma County. These individual impacts are summed up to estimate changes in total jobs, total personal income, and population, and are expressed as a departure from the predicted baseline scenario/No Action Alternative estimated impacts across the 20-year planning period. These results are summarized in Table 4-34, and discussed in detail below. Appendix I presents background data, information, and methods descriptions for these analyses.

Table 4-34 Summary of Economic Impacts, End of Planning Period				
Percentage Change from Alternative I (No Action Alternative)				
Measure	Alt II	Alt III	Alt IV	Alt V
Total Jobs	(-) 2%-4%	No change	(+) 5%-10%	(+) 4%-8%
Total Personal Income	(-) 0.15%-0.3%	No change	(+) 1%-2%	No change
Population	No change	No change	No change	No change
Total Jobs	(-) 2%-4%	No change	(+) 5%-10%	(+) 4%-8%
Total Personal Income	(-) 0.15%-0.3%	No change	(+) 1%-2%	No change

Alternative I (No Action Alternative)

Table 4-35 summarizes some of the demographic and economic parameters used to determine the baseline economic scenario described by Alternative I.

Table 4-35 Summary of Economic Baseline/No Action Forecast for Study Area					
Parameter	2005	2010	2015	2020	2025
Montezuma County					
Total Jobs ¹	12,600	14,400	15,500	16,700	17,900
Total Base Jobs	7,600	8,300	8,700	9,400	10,200
Total Tourism Jobs	1,460	1,540	1,500	1,460	1,400
Total Personal Income (\$ millions)	660	920	1,270	1,790	2,480
Farm Proprietor Income	9.6	7.7	7.6	7.7	7.5
Annual CO ₂ Production (bcf) ²	360	490	490	490	490
Annual Oil Production (1000 bbls)	200	200	200	150	100
Annual Nat. Gas Production (bcf)	1.1	1.1	1.1	0.75	0.50
Population ³	24,900	27,600	30,400	33,800	36,800
Dolores County					
Total Jobs ¹	800	930	990	1,060	1,140
Total Base Jobs	680	710	720	750	790
Total Tourism Jobs	30	30	30	30	30
Total Personal Income	50	68	93	130	180
Farm Proprietor Income	1.9	1.5	1.5	1.5	1.5
Annual CO ₂ Production (bcf) ²	0	65	65	65	65
Annual Oil Production (1000 bbls)	40	40	40	30	20
Annual Nat. Gas Production (bcf)	0.3	0.3	0.3	0.2	0.1
Population ³	1,850	2,060	2,220	2,380	2,720

(Sources: ¹Region 9 2006 CEDS update, ²RFD, ³CSDO 2006)

Overall, the demographics of Montezuma and Dolores Counties are forecast to parallel those of Colorado in general. Population in the study area is anticipated to grow from just under 30,000 to over 40,000 over the next 20 years. Although there will be good and bad years in agriculture, long-term trends show a drop in farm earnings that may reduce farm income as a percentage of total personal income for the two counties to less than one percent. Non-labor income may continue to comprise more than one-third of total personal income, providing a buffer to the cyclical changes in tourism and mining employment.

Tax revenues from fluid minerals production (primarily CO₂ production) comprise almost half of the total revenues in Montezuma County, and one-quarter of the total revenues in Dolores County. Therefore, changes to fluid minerals production and prices may have a significant impact on county budgets. Under the No Action Alternative, CO₂ production may increase as a result of increasing pipeline capacity from 1.1 billion cubic feet bcf to 1.5 bcf per day, and may remain steady through the planning period (RFD, BLM 2005c). Note that part of the increased CO₂ production would occur in Dolores County, which would provide a new source of revenue there. Oil and gas production is forecasted to decline steadily, as the existing fields are depleted and no new large finds are anticipated. The net change to county tax revenues is forecast to be neutral, because increased CO₂ production and pricing may make up for the decrease in oil and gas production.

The proposed rangeland management actions under the No Action Alternative would not change the total active AUMs, and would strive to improve rangeland conditions to meet Public Land Health Standards. This may result in a slight increase in agricultural income over the long term, as pasture conditions improve. The management actions proposed for recreation and transportation management may increase visitor use of the Monument. Fluid minerals management actions would not include any new leases. This may reduce oil and natural gas production, as well as mining jobs and income over the long term (50+years). However, current CO₂ development undertaken on existing leases would increase annual production from 360 bcf to 420 bcf.

The economic impacts of Alternative I are summarized in Table 4-36, and include an estimate of total jobs, total personal income, and population for the study area (Montezuma and Dolores Counties, combined).

Table 4-36 Economic Impacts for Baseline/Alternative I (No Action Alternative)					
Parameter	2005	2010	2015	2020	2025
Total Jobs	13,400	15,330	16,490	17,760	19,040
Total Personal Income (\$ million)	710	990	1,360	1,920	2,660
Population	26,760	29,660	32,620	36,180	39,520

Alternative II

Management actions for Alternative II would reduce active AUMs by about 25 percent, bringing grazing activity closer to pasture carrying capacity and to recent actual use. Reducing AUMs by 25 percent may reduce agricultural income in Montezuma County by about one-half of one percent. This is estimated as a result of considering the options available to ranch operators when faced with fewer AUMs (see Appendix I). Recreation and transportation management may result in a minor reduction in recreational use of the Monument. This is estimated to reduce tourism jobs by 10 to 25 percent, when compared to the No Action Alternative (see Appendix I for details on the relationship between tourist visits and tourism jobs). Fluid minerals management actions may result in one new oil and gas well on new leases, which would keep oil and gas production at the levels forecasted under the No Action Alternative. One new CO₂ well is anticipated on new leases under Alternative II. This may keep CO₂ production at levels forecasted under the No Action Alternative. The impacts of these changes on total jobs, personal income, and population may be a reduction of two to four percent in total jobs, and

about two-tenths of one percent reduction in total personal income, due to agricultural income losses compared, when compared to Alternative I. These impacts are summarized in Table 4-37.

Parameter	2005	2010	2015	2020	2025
Total Jobs	13,100	14,900	16,000	17,000	18,300
Total Personal Income (\$ million)	710	990	1,360	1,920	2,660
Population	26,760	29,660	32,620	36,180	39,520

Alternative III

Management actions for Alternative III would reduce active AUMs by about two percent, and would administer grazing permits to meet Public Land Health Standards. This may not change agricultural income or jobs, when compared to the No Action Alternative. Recreation management actions may restrict management activities and may reduce recreation use of the Monument. Transportation management actions would increase motorized use of the Monument. Therefore, the net change in tourism spending on the region is anticipated to be the same as the No Action Alternative, leaving tourism jobs and income unchanged. Fluid mineral management may result in up to two new oil and gas wells and five new CO₂ wells on new leases, which may keep production levels the same as under the No Action Alternative. Overall, the management actions for Alternative III may result in the same total jobs, personal income, and population as under Alternative I (see Table 4-36 for results).

Alternative IV

Management actions for Alternative IV would not change the number of active AUMs; therefore, there would be no change in agricultural jobs or in income, when compared to the No Action Alternative. Recreation and transportation management actions may increase recreational use and visits, moderately. This may increase tourism visits and jobs in Montezuma County by 25 to 50 percent over the No Action Alternative. Fluid minerals management actions may result in up to 12 new oil and gas wells and up to 38 new CO₂ wells on new leases. This may increase oil and gas production by up to 10 to 15 percent over the No Action Alternative because a new discovery may replace declining oil and gas production and/or new enhanced oil recovery using local CO₂ to flood existing oil and gas reservoirs may be undertaken.

The increase in tourism and mining jobs may result in total jobs increasing by five to ten percent over the No Action Alternative. Increased fluid minerals production and tourism income may increase total personal income by one to two percent. Population is not expected to change, when compared to the No Action Alternative, because tourism jobs do not generally attract long-term residents, and there may be only a few mining jobs. These impacts are summarized in Table 4-38.

Table 4-38 Economic Impacts for Alternative IV					
Parameter	2005	2010	2015	2020	2025
Total Jobs	14070	16250	17640	19180	20940
Total Personal Income (\$ million)	720	1000	1390	1960	2710
Population	26760	29660	32620	36180	39520

Alternative V (Preferred Alternative)

Management actions for the Preferred Alternative would reduce active AUMs by 25 percent, bringing grazing activity closer to pasture carrying capacity and recent actual use. Reducing AUMs by 25 percent may reduce agricultural income in Montezuma County by about one-half of one percent (see Alternative II for details). Recreation and transportation management actions may increase recreational use and visits, moderately. This may increase tourism jobs in Montezuma County by 25 to 50 percent above the No Action Alternative.

Fluid mineral management actions may result in up to one new oil and gas well on new leases, which may keep oil and gas production at the levels forecasted in the No Action Alternative. Up to one new CO₂ well is anticipated on new leases under Alternative V. This may keep CO₂ production at levels forecasted under the No Action Alternative. Overall, the management actions under the Preferred Alternative may result in an increase in total jobs of four to eight percent over the No Action Alternative. Total personal income may be unchanged, as increases in low-wage tourism jobs may be offset by losses in agricultural income due to the reduced AUMs. Population may also remain unchanged, when compared to the No Action Alternative. The economic impacts of Alternative V are summarized in Table 4-39.

Table 4-39 Economic Impacts for Alternative V (Preferred Alternative)					
Parameter	2005	2010	2015	2020	2025
Total Jobs	13940	16100	17480	19000	20560
Total Personal Income (\$ million)	710	990	1360	1920	2660
Population	26760	29660	32620	36180	39520

4.4.2.1. Social Impact Analysis

The social impact analysis uses two variables: 1) settlement patterns, and 2) community resources. Settlement patterns measure the rate at which land is converted from existing uses, such as agricultural, to a different land use, such as residential. This may impact the quality of life in the region, as open space amenities are highly valued in the community. Community resources measure impacts to social services and organizations that support the rural lifestyle that defines and organizes communities in Montezuma and Dolores Counties. Table 4-40 defines terms used in the social and cumulative impact analysis (see Appendix I for details on estimating social impacts).

Table 4-40 Measures for Social and Cumulative Impact Analysis	
Term	Definition
None	No change to current conditions or baseline forecast.
Negligible	No measurable change from current conditions or baseline forecast. Any changes are of short duration – 1 year or less.
Minor	Small change in current conditions or baseline forecast. Impacts may be detectable, but temporary – less than 2 years.
Moderate	Small, but permanent, change to current conditions or baseline forecast. Impacts may be measurable and directly attributable to management actions. Impacts may be long-term (greater than two years) or permanent, and may increase over time.
Major	Highly noticeable long-term or permanent changes from current conditions or baseline forecast that can be directly attributed to management actions. Impacts may be of concern to the public – media attention, local officials take action. Impacts may be long-term (greater than two years) or permanent, and likely to increase over time.
Direct	Action may cause a primary reaction or change in the study area's society and/or economy.
Indirect	Action may cause a secondary reaction or change in the study area's society and/or economy.
Beneficial	Positive impacts.
Adverse	Negative impacts.
Localized	Highly specific location.
Temporary	Impact may occur only during implementation, and generally may last no more than two (2) years.
Short-term	Impact may occur only for a short time (less than 2 years) after implementation.
Long-term	Impact may occur for an extended period (more than 2 years) after implementation.
Permanent	The society and/or economy of the study area would never revert back to current condition after implementation

Alternative I

The management actions for the Alternative I may result in improved rangeland health, as grazing permits are managed to improve rangeland condition to meet Public Land Health Standards. There would be no new fluid mineral leases. Combined, these management

actions may improve open space amenities in the Monument. Recreation and transportation management actions may support increased recreational use of the Monument. Under the No Action Alternative, rising land values, amenity migration, and increased agricultural input costs may result in conversion of about one-third of existing private agricultural land in the study area into residential and/or other land uses during the next 20 years. This was estimated from historical agricultural land conversion rates and planning forecasts for the study area (see Appendix I for details).

Community resources, especially county social services, may be maintained at present levels of availability and quality of service under the No Action Alternative (see Appendix I for details).

Alternative II

Management actions for Alternative II would reduce grazing activity in the Monument to improve rangeland health. Reducing grazing opportunities may reduce the economic viability of some ranching operations in Montezuma and Dolores Counties, potentially accelerating the development of agricultural land. Recreation and transportation management actions may reduce recreational use of the Monument; therefore, private open space and remote recreation amenities may be reduced directly and indirectly by these actions. Community resources may remain the same as under the No Action Alternative due to the fact that fluid minerals production would be the same. Overall, Alternative II may have minor adverse social impacts, when compared to the No Action Alternative.

Alternative III

Management actions for Alternative III may result in small net changes in recreational use of the Monument and amenities. Rangeland health may improve, but new fluid minerals development may offset open space amenity improvements. Recreation management actions may restrict recreational use, but transportation management actions may increase motorized use. Overall, land-use patterns and community resource may not be changed from the No Action Alternative. Alternative III may have negligible social impacts, when compared to the No Action Alternative.

Alternative IV

Management actions for Alternative IV may increase recreational use and new fluid minerals development in the Monument. Grazing would remain the same as in the baseline, but rangeland health may slowly improve. Increased tourism and fluid minerals tax revenues may support increased county social services. However, accelerated tourism and industrial activity may also increase and/or shift demands for social services, especially if a “boom town” phenomenon develops. Under this scenario, private open space amenities may be the same as under the No Action Alternative, but Monument open space amenities may be reduced. Overall, Alternative IV may have minor beneficial social impacts, when compared to the No Action Alternative.

Alternative V

Management actions for the Preferred Alternative would reduce livestock AUMs, as it would under Alternative II, which may indirectly impact the viability of agricultural open space amenities. Recreation and transportation management actions may increase the recreational use of the Monument. Fluid minerals development may be managed to maintain the same production levels (and tax revenues) as under the No Action Alternative. Overall, open space and recreational amenities in the Monument, as well as community resources, may be improved over the No Action Alternative. Open space amenities associated with private agricultural land may be indirectly reduced, when compared to the No Action Alternative. Therefore, the Preferred Alternative may have minor beneficial social impacts.

4.4.2.2. Cumulative Impacts

Cumulative socioeconomic impacts are analyzed by accumulating direct and indirect impacts across time and key trends. The baseline trends driving social and economic changes in the study area include amenity migration and boom/bust cycles. These trends are expected to result in one-third more people living in the study area, about one-third of existing agricultural land being developed for residences, and personal income levels staying below the average for Colorado. In estimating cumulative socioeconomic impacts, it is important to identify potential “tipping points” that leverage major shifts in economic and/or social patterns for the study area.

Two tipping points have been identified: 1) changes to open space amenities and rural lifestyle that accelerate or decelerate amenity migration, and 2) boom/bust cycle related to fluid minerals development. Amenity migration is shaping future population and demographics for the study area. If management actions were to tip the balance of baseline trends to significantly degrade the quality and/or the quantity of open space amenities, such as vistas, wildlife habitat, and/or remote recreation, the rate of amenity migration may decrease or reverse. Furthermore, management actions that reduce rangeland grazing quality and/or quantity may indirectly impact the viability of agricultural enterprises in the study area, and may reduce private open space amenities. Under the No Action Alternative, Monument open space amenities may become more valuable to residents as one-third of existing private agricultural land is converted to residential development.

Presently, the Four Corners region is experiencing an economic and population boom caused by coal-bed methane development in the San Juan Basin. Counties in the Four Corners are experiencing some of the fastest growth in population and personal income for any of their respective counties. High natural gas prices and new coal-bed methane recovery technologies are fueling this boom. However, natural gas production in the San Juan Basin peaked in 2003 and is expected to decline in the future due to resource depletion (Durango Herald 2006). The study area has been defined in part by boom/bust cycles in hard rock mining and forestry. If management actions, such as increased fluid mineral development, were to amplify the boom/bust cycle, it may result in social impacts, such as insufficient social services and infrastructure to serve the population boom. A bust may likely be caused by an action completely outside the control of the BLM, such as a drastic reduction in natural gas and/or oil prices. A bust may reduce county tax revenues to levels insufficient to support baseline social services. In the cumulative impact analysis, management actions with the potential for causing a tipping point are highlighted.

Alternative I (No Action Alternative)

The management actions of the No Action Alternative may improve the long-term viability of ranching, and may help to maintain the benefits of open space and rural lifestyle provided by private agricultural lands in the study area. Alternative I may also maintain county tax revenues from fluid mineral development through existing leases, as well as maintain diverse recreation opportunities in the Monument.

Alternative II

The management actions of Alternative II may have the highest likelihood of impacting the amenity-migration tipping point. Reduced grazing opportunities may indirectly reduce open space amenities on private land and restricted recreation use may reduce remote recreation opportunities in the Monument. In combination, these actions may be enough to tip the balance of open space amenities in the study area and decelerate or reverse amenity migration. It is not possible to measure the likelihood of tipping this balance. However, because of this possibility, cumulative impacts may be adverse and minor, when compared to Alternative I.

Alternative III

Over the long term, restricted recreational use and fees under Alternative III may reduce tourism and the income, jobs, and amenity migration that it supports. However, continued development of fluid minerals, especially CO₂ may provide counties with a stable revenue source, and may make it possible to maintain and/or perhaps improve the quantity and/or quality of social services in the study area. The viability of agricultural operations may not be further threatened by this alternative. The net long-term impact of the combination of these management actions may be very similar to the No Action Alternative. The cumulative impacts for Alternative III may be negligible, when compared to Alternative I.

Alternative IV

Over the long term, Alternative IV may have the highest potential for conflicts between recreation and other resource uses. Increased income and population in the study area may add pressure to remaining open space and to remote wilderness areas. Increased fluid minerals development may reduce land areas with these characteristics in the Monument. Continued development of fluid minerals, especially CO₂ may provide counties with a stable revenue source, and may make it possible to maintain and/or improve the quantity and/or quality of social services in the study area. The viability of agricultural operations may not be further threatened by this alternative. This alternative may have the greatest potential for amplifying the boom/bust cycle. It is not possible to predict the size and/or the rate of amplification; however, because of this possibility, cumulative impacts may be adverse and minor, when compared to Alternative I.

Alternative V (Preferred Alternative)

Under the Preferred Alternative, the impacts of some management actions, such as reducing the number of AUMs, may have indirect adverse impacts on private open space amenities. The net economic impacts may likely be beneficial under the Preferred Alternative because income and employment related to tourism and fluid mineral development may offset losses in the agricultural sector. Continued fluid minerals development may support baseline social services. Increased recreational opportunities and improved rangeland health may enhance the amenities in the Monument. It is not possible to determine whether or not enhanced open space amenities in the Monument would offset private land losses. However, the net impact, when compared to the No Action Alternative, may be minor beneficial cumulative impacts.

4.4.2.3. Environmental Justice

Executive Order 12898 requires that all Federal actions must consider potentially disproportionate impacts on minority and/or on low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the NEPA (Council on Environmental Quality 1997). These principles are recognized, and have been considered in this analysis. Native Americans are the only minority race present in the study area in a greater proportion to other minorities than the rest of the State. Native Americans comprise 13 percent of the Montezuma County population (CSDO 2005). Most of these residents are members of the Ute Mountain Ute Tribe (Utes).

During the scoping process, Ute representatives identified several issues of concern (BLM 2003e and 2004d):

- access to, or continuation of, historical uses, such as grazing, offering sites, herb-gathering, and places of prayer offering;
- conflicts with the Brunot Treaty (i.e., access to historical hunting grounds);

- excavation leading to artifacts being taken away and placed in storage or on display (i.e., a loss of control and/or ability to appreciate artifacts as left by ancestors);
- lack of involvement or “hearing” in actual decision-making;
- agency failing to honor policies for “returning human remains back to the ground;” and
- oil and gas development impacts to archeological sites and human remains.

Inherent in each concern is the Ute history of distrust toward European settlers, and toward the United States government. This distrust is founded on the history of broken treaties with the Utes, beginning around 1849. Originally, “Utes” were a large band of Native American who occupied a territory, including New Mexico, Oklahoma, Texas, Kansas, Wyoming, Utah, and Colorado. The discovery of minerals and the ever-expanding settler population resulted in a rash of renegotiated treaties for over 50 years. One of the last, and most relevant, was the Brunot Treaty of 1873. In short, the Utes gave up access to most of their traditional Colorado territory, in return for a \$25,000 annual payment, permission to hunt in the San Juan Mountains, an increase in Chief Ouray’s salary from \$500 to \$1,000 a year, and a government reaffirmation that unauthorized persons should not enter the reservation (USGS 2004). In a 2005 San Juan National Forest Planning roundtable, Peter Ortego, Attorney for the Ute Mountain Ute Tribe, stated that the “Tribes (Ute Mountain Ute and Southern Ute) are very concerned about restrictions on access, because their hunting rights predate the existence of the state and natives have been using these areas for a long time. There needs to be sensitivity to this issue, and the Utes do not want a battle over access” (USFS 2005).

Management actions, such as reductions in permitted grazing, further development of archeological sites, increased oil and gas development, and/or road closures may impact the this tribe’s historical sense of exclusion from access to their traditional areas, decisions about use and management, as well as the gains realized from extraction. Currently, and in the 20-year horizon of this study, Utes are not adversely impacted economically. In fact, their tourism enterprises stand to benefit from the increased visitation to the Monument. Utes are impacted further socially by what is perceived as yet another infringement upon their historic lands and rights. The social impacts to the Utes may be easily mitigated through a careful assessment of how access to popular areas would be altered, through consultation on each planned change to existing archeological sites, and through the minimization of further plans to excavate and stabilize new sites. Continuation of a regular collaborative approach may improve relations with Native American tribes and with Pueblos, as well as management of the Monument.