



Chapter IV: Environmental Consequences

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CHAPTER IV: ENVIRONMENTAL CONSEQUENCES

A. How to Read this Chapter

Chapter IV presents the potential impacts to the natural and human environment in terms of environmental, social, and economic consequences that are projected to occur from implementing the alternatives presented in Chapter II. Chapter IV contains seven main sections:

- How to Read this Chapter
- Introduction
- Analysis Assumptions and Guidelines
- Impacts by Alternative
- Cumulative Impacts
- Irreversible or Irrecoverable Commitment of Resources
- Unavoidable Adverse Impacts

The *Introduction* section includes definitions of the types of effects that will be projected throughout the impact sections, discusses the availability of data, and identifies the BLM's Critical Elements. This section is followed by *Analysis Assumptions and Guidelines*, which presents important assumptions that are used throughout the chapter.

The detailed analysis of impacts in *Impacts by Alternative* is organized by issue, as presented in Chapters I, II, and III. Major issue headings are:

- Issue 1: Travel Management
- Issue 2: Recreation
- Issue 3: Natural and Cultural Resources
- Issue 4: Lands and Realty
- Issue 5: Vegetation Management
- Issue 6: Leasable and Locatable Minerals
- Issue 7: Subsistence/Social and Economic Conditions

The order of the issues does not reflect their level of importance. Subsistence is discussed last to consider potential impacts to subsistence that could result from proposed management actions or allowable uses described under the previous six issues.

As in Chapters II and III, there are sub-headings under each of these major issue headings. Under each of these issue headings and sub-headings, impacts are discussed for each alternative. Since Required Operating Procedures and Oil and Gas

Leasing Stipulations have been included in the action alternatives (Alternatives B, C, and D) as design features, many impacts are reduced or eliminated up front.

The sub-section under each heading titled *Impacts Common to All Alternatives* describes impacts that will not vary by alternative. This information is presented to avoid repetition in the *Impacts by Alternative* section. These impacts are not discussed again. Resources that only have impacts that are common to all alternatives are only discussed in this section as well and are not discussed further.

Laws, regulations, and policies affecting BLM management and planning are included as Appendix G. Standard operating procedures resulting from these laws, regulations, and policies would continue to be followed under all alternatives. These standard operating procedures constitute day-to-day implementation of policy and management, and often result in certain projects being mitigated, redesigned, or dropped from consideration. Associated limitations or complications they may present to programs (e.g., increased processing times or costs) are not considered impacts and are not discussed further in this document.

Separate sections at the end of this chapter describe *Cumulative Impacts* (page 579), *Irreversible or Irrecoverable Commitment of Resources* (page 593), and *Unavoidable Adverse Impacts* (page 599).

B. Introduction

The analysis of impacts associated with the alternatives is required by BLM planning regulations and by the Council on Environmental Quality (CEQ) regulations at 40 CFR 1500-1508 implementing the National Environmental Policy Act (NEPA). The analysis presents best estimates of impacts. As required by NEPA, direct, indirect, and cumulative effects are discussed.

When quantitative information is available, impacts have been calculated primarily through GIS applications. Since the alternatives generally describe overall management emphasis, the environmental consequences are most often expressed in comparative, general terms.

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources and the planning area, information provided by experts in the BLM or in other agencies, and information contained in pertinent existing literature. The baseline used for the impact analysis is the current condition or situation described in Chapter III, Affected Environment. Analysis assumptions have also been developed to help guide the determination of effects (see *Analysis Assumptions and Guidelines* beginning on page 402 of this chapter). Since the Draft RMP/EIS provides a broad management framework, the analysis in this chapter represents best estimates of impacts since exact

locations of development or management are often unknown. Impacts are quantified to the extent practical with available data. In the absence of quantitative data, best professional judgment provides the basis for the impact analysis.

1. Types of Effects

Direct, indirect, and cumulative impacts are considered in this effects analysis, consistent with direction provided in 40 CFR 1502.16.

Direct impacts are caused by an action or by implementation of an alternative and occur at the same time and place as that action or implementation. Indirect impacts also result from an action or implementation of an alternative, but usually occur later in time or removed in distance from the action or implementation. Cumulative impacts result from individually minor but collectively significant actions over time.

Actions anticipated over the next 20 years on all lands in the planning area, including private, State, Native corporation, and Federal (USDA FS, NPS) lands, have been considered in the analysis to the extent reasonable and possible. Decisions about other actions occurring within the planning area could be made by many public and private entities, though the location, timing, and magnitude of these actions are not well known. Assumptions about actions outside of the BLM's jurisdiction that are considered in the cumulative effects analysis include the following:

- ANCSA and State land entitlements will be fulfilled within the 20-year planning period.
- BLM will retain 15-25 percent of the lands currently selected by the State or Native Corporations; conversely, the BLM will lose 75-85 percent of lands that are currently State- or Native-selected.
- Land sales (settlement and remote settlement areas) will continue on State lands consistent with State DNR area plans.
- Mineral exploration and development will increase on State lands within the planning area.
- Mineral exploration and development will increase on Native Corporation lands.
- Mineral exploration and development will remain minimal in Wrangell-St. Elias National Park and Preserve and on adjacent USDA Forest Service lands.
- Timber harvest will occur on Ahtna Native Corporation lands (in some areas occurring in large harvest blocks); timber will be chipped and trucked to shipping in Valdez.
- Some timber harvest will occur on State lands, particularly on lands south and west of Glennallen. Harvest on State lands will be constrained by access.
- Large scale, stand-replacing wildland fires can be expected on State, Native, and NPS lands as average temperatures continue to increase.
- Access to public lands will decrease as land entitlements by Native Corporations are fulfilled.

- Wrangell-St. Elias National Park and Preserve will continue to manage for fly-in, remote, primitive recreation experiences throughout most of the 13-million acre Park.
- Unmanaged proliferation of OHV trails will continue on accessible State-managed lands.
- Road construction will increase on State lands in support of mineral exploration and development.
- The number of trails and roads within Wrangell-St. Elias National Park and Preserve will remain stable.
- The State will continue to push for conveyance of the transportation and utility corridor and use of this corridor as a possible gas pipeline route.
- Use of communication sites and corridors will increase.
- Military activities and infrastructure will increase.

To avoid repetition, if the impacts of an action would be the same as previously described for an earlier alternative, a statement such as “impacts would be the same as under Alternative A” or “impacts would be the same as under Alternative A, except for . . .” may be inserted as applicable.

Irretrievable or irreversible commitment of resources and unavoidable adverse impacts are also discussed at the conclusion of the environmental consequences section after the *Cumulative Impacts* section. Irreversible commitments of resources result from actions in which resources are considered permanently *changed*; irretrievable commitments of resources result from actions in which resources are considered permanently *lost*. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures, and include impacts for which there are no mitigation measures.

2. Availability of Data and Incomplete Information

The best available information pertinent to the decisions to be made was used in development of the RMP. Considerable effort has been taken to acquire and convert resource data into digital format for use in the plan. Data has been acquired from BLM sources and from outside sources such as the State of Alaska and National Park Service.

Some information was unavailable for use in developing this plan, usually because inventories have either not been conducted or are not complete. Specific data that was unavailable include:

- Complete inventory/assessment of an estimated 1,300 miles of trails.
- Detailed soil surveys.
- Invasive weed occurrence.
- Definitive sensitive species occurrence (plant and animal).

- Certain wildlife data (specific critical habitat locations for many species).
- Watershed assessments for areas outside the Gulkana River watershed.
- Riparian assessments outside the Delta and Gulkana Rivers and their tributaries.

As a result of these deficiencies, impacts cannot be quantified given the proposed management of certain resources. In these instances, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent project-level analysis will provide the opportunity to collect and examine site-specific inventory data necessary to determine the appropriate application of the RMP level guidance. In addition, ongoing inventory efforts identified in Chapter II will continue to update and refine the information used to implement this plan.

3. Critical Elements

The BLM's National Environmental Policy Act Handbook, as supplemented with BLM Instruction Memorandum No. 99-178, identifies 14 "Critical Elements of the Human Environment" that must be addressed during environmental analysis (BLM 1988b Appendix 5; BLM 1999):

1. Air Quality
2. Areas of Critical Environmental Concern
3. Cultural Resources
4. Environmental Justice
5. Floodplains
6. Hazardous or Solid Wastes
7. Invasive, Non-native Species
8. Native American Religious Concerns
9. Prime or Unique Farmlands
10. Threatened or Endangered Species
11. Water Quality
12. Wetlands/Riparian Zones
13. Wild and Scenic Rivers
14. Wilderness

There are no Prime or Unique Farmlands on BLM-administered lands within the planning area, nor are there any Areas of Critical Environmental Concern (ACECs). The remaining 12 elements are identified and addressed in the pertinent sections of this chapter. Impacts related to proposed designations or findings are described.

C. Analysis Assumptions and Guidelines

Several assumptions were made to facilitate the analysis of potential impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the planning area over the next 15-20 years. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative and described in Chapter II. If no assumptions were made for a particular resource, the heading is not included in the following sections.

1. General Assumptions

- Sufficient funding and personnel would be available for implementation of the final RMP decision.
- Implementation of actions from any of the RMP alternatives would be in compliance with all valid existing rights, Federal regulations, bureau policies, and other requirements.
- Appropriate maintenance would be carried out to maintain the functional capability of all developments.
- The discussion of impacts is based on the best available data. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data is limited.
- Acreage figures and other numbers used in the analysis are approximate projections for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations.
- State and Native entitlements will be met sometime within the planning period, reducing current BLM-managed lands in the planning area by as much as 5.5 million acres (7.1 million acres are currently managed by the BLM).
- State- and Native-selected lands are segregated from mineral entry. These lands will become available for mineral entry or leasing only when they either are conveyed out of Federal ownership or are returned upon rejection of land selection.

2. Resource Assumptions

a) Issue 1: Travel Management

(1) Access

Demand for adequate access – the physical ability and legal right of the public, agency personnel, and authorized users to reach public lands – will remain high over the life of the plan. Access to public lands will decrease slightly as Native Corporation entitlements are met and as private lands become more developed.

(2) OHV Management and Trails

Demand for access and use of OHV trails will increase. The use of OHVs for recreational purposes (including sport fishing) will increase while the use of OHVs for hunting and subsistence will remain stable or increase slightly. Changes in OHV design and technology will continue, enabling OHV users to range into areas that were once thought of as inaccessible due to terrain and water or soil features.

For the purposes of this document, OHVs include snowmachines. However, most impacts described in this analysis result from OHVs used during snow-free months. Where impacts are specific to snowmachines, they are described as such.

(3) Roads

Demand for roads within the planning area to access private inholdings or to support mineral exploration and development or other resource developments on or across BLM-managed lands will increase.

b) Issue 2: Recreation

(1) General Recreation

Demand for recreational use of public lands will increase over the life of the plan. Increases will be focused on sport fishing, recreational OHV use (including snowmachines), hiking and canoeing/rafting, and highway tourism (bus tours, summer use of Recreation Vehicles [RVs]). Commercial recreation applications will increase in number.

c) Issue 3: Natural and Cultural Resources

(1) Soils

Climate change will impact soils in the area, probably to a greater extent than any other activity analyzed in this EIS. This change will occur through the decrease of permafrost in the area, with subsequent impacts on evapotranspiration, runoff, fire frequency, and vegetation.

(2) Water Quality

Demand for water (both quantity and quality), especially in the planning area's clear-water streams and rivers, will increase as a result of increasing recreation use, an increasing population in the Copper River Basin, and an increase in mineral exploration and development. Water quality requirements will be achieved through the use of Required Operating Procedures.

(3) Air Quality

Increasing uses of the area for recreational and aesthetic reasons may lend importance to maintaining the current quality of the air, especially during seasons of high visitation.

The most likely causes of deterioration in air quality in the planning area are emissions from fire (wildfire or prescribed), dust from travel on roads (particularly on the Denali Highway), and dust and exhaust from construction or development activities.

(4) Vegetation

(a) Forest, Woodlands, and Shrublands

Demand for healthy forests and woodlands will increase based on desires for wildlife habitat and maintenance of healthy upland communities to support watershed health and support of the sustainable production of forest products such as firewood and house logs. Demand for subsistence uses associated with these vegetation types will also increase. These uses include personal firewood and house log gathering, as well as berry-picking and collection of plant materials such as diamond willow for arts and crafts. Vegetation treatments to forests, woodlands, and shrublands will promote successional changes that will restore vigor and vegetation production, create a mosaic of vegetation types, and promote maintenance of early-seral shrub-dominated plant communities. Climate change will continue, with potential for significant changes in arctic and sub-arctic vegetation over time. Warming has the potential to cause land cover changes in high latitude regions through both vegetation replacement and increasing frequency of disturbance. There is some evidence that tundra in Alaska is becoming more shrubby, and there is the potential for climatic warming to transform tundra regions into boreal forest (Walsh 2004).

Both natural and human-caused fire events will likely increase as fuel loading increases in both black spruce and beetle-kill white spruce. Fires will most likely increase in size and intensity during the life of this plan due to fuel loading, lack of periodic fire across the landscape in the last 50 years, and increasing temperatures. Fire suppression efforts will continue in areas of urban interface and where wildland fire would produce undesirable resource effects.

(b) Riparian and Wetland

The condition of riparian communities will be maintained at proper functioning condition as management measures are implemented. Demand on specific riparian and wetland areas will increase with general increased recreational use, particularly in the Delta and Gulkana Wild and Scenic River corridors. This increase will result in localized impacts to riparian vegetation, but not at levels that threaten proper functioning condition.

(c) Noxious Weeds and Invasive Plants

Inventory efforts will continue to identify specific occurrence of noxious weeds and invasive species. The demand for control of weeds will increase as general public knowledge of the detriments of noxious weeds increases. Increases in invasive species will reduce habitat quality and quantity.

(5) Wildlife

There is a direct relationship between the quantity and quality of habitat and the size, diversity, and viability of species populations. Habitat requirements for any particular species cannot be met everywhere (species specific needs are often very site-specific). Habitat may be only seasonally available due to elevation, aspect, type of vegetation present, and proximity of human disturbance. Habitat conditions will vary due to natural processes and wildlife uses even if human-caused influences are reduced or eliminated.

Management actions intending to benefit a specific habitat for a priority species will influence any other species occurring in that same habitat. Therefore, impacts to wildlife populations and habitat are not discrete since actions may benefit one species while having an adverse, or beneficial, impact on another. Maintaining high quality habitat conditions can have some influence on reducing the severity of outbreaks of and subsequent losses from diseases, but the prevalence in the environment of various diseases cannot be fully controlled, particularly at chronic levels of occurrence.

Demand for the improved health of wildlife habitat will increase over the life of the plan given the generally linear increase in demand for caribou and moose permits within the planning area. Demands on habitat from caribou and moose will generally increase with current predator control programs as ungulate populations increase, though populations will fluctuate over the course of the planning period

(a) Special Status Wildlife Species

Continuing and additional inventory will identify additional sensitive status species on lands administered by BLM, and will likely include the expansion of known ranges of species currently on the BLM-Alaska special status species list. Nationally, demand for the protection of species listed under the Endangered Species Act, as well as for species not yet listed but of concern, will likely increase. There are no listed threatened or endangered species within the planning area, but there are several plant and animal species listed as sensitive status species. Demand for protection of these species will increase as inventory indicates specific habitat niches or requirements, and as increased visitor use or development activities place demands on associated habitats.

(6) *Fish*

The demand for fisheries resources from increased sport and subsistence fishing will increase over the life of the plan, resulting in increased pressure on populations in the planning area. There is a direct correlation between the amount of quality habitat and fish populations. Potential impacts to habitat quality will increase over the planning period. The BLM will cooperate with the Alaska Department of Fish and Game to manage, to protect, and to maintain the genetic integrity of Alaska's wildstock populations of salmon.

(7) *Cultural Resources*

Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable cultural resources. The BLM will continue to mitigate impacts to cultural resources from authorized uses through project abandonment, redesign, and, if necessary, data recovery investigations in accordance with the 1997 BLM National Programmatic Agreement for Section 106 Compliance and the 1998 Implementing Protocol with the Alaska State Historic Preservation Officer for managing cultural resources on lands administered by the BLM in Alaska.

Without a limited inventory of cultural resources on public lands within the planning area, the exact number, kind, and variability of cultural resources will remain unknown. However, new cultural resources will continue to be found and evaluated for eligibility to the National Register of Historic Places as additional inventories are completed for compliance projects. Eligible cultural resources will continue to be treated similarly and equally in terms of type, composition, and importance, but many will continue to deteriorate through natural agents, unauthorized public use, and vandalism. The BLM will continue to consult with Native and Village Corporations on traditional cultural properties and values that are of concern to them.

All archaeological resources will be assessed according to BLM use categories. The demand for use of cultural resources will increase over the life of the plan. Interest from the general public in cultural resources and from Village corporations and councils in

traditional uses will increase. The demand to use cultural resources by the academic community in scientific research will increase slightly.

(8) *Paleontological Resources*

Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable paleontological resources. The BLM will continue to mitigate impacts to paleontological resources from authorized uses through project abandonment, redesign, and specimen recovery. Geologic formations with exposures containing vertebrate and non-vertebrate fossils will continue to be impacted from natural agents, unauthorized public use, and vandalism.

The demand for use of both vertebrate and non-vertebrate fossils will increase over the life of the plan. The casual-use and collection of non-vertebrate fossils by rock hounds and fossil collectors will increase. Scientific interest in vertebrate fossils by the academic community will increase slightly.

(9) *Visual Resources*

Scenic resources will remain in demand from local residents who want to maintain scenic quality, local businesses that depend on tourism, and an increasing level of recreational users within the planning area over the life of the plan. Increasing tourism will increase the value of scenic views, undeveloped landscapes, and open spaces.

(10) *Wild and Scenic Rivers*

Recreational use of the Delta and Gulkana Wild and Scenic River corridors will continue to increase. Prescribed management will protect the outstandingly remarkable values for which the rivers were designated, requiring a mix of education and regulatory measures. Mineral development will occur outside the Delta River corridor, placing possible demands for access or rights-of-ways across the corridor.

d) Issue 4: Lands and Realty

(1) *Land Use Authorization*

There will be a continued demand for land use authorizations such as rights-of-way and various types of leases and permits within the planning area for the life of the plan. The demand for these land use authorizations will fluctuate directly with the degree of economic growth and development occurring within and adjacent to the planning area.

(2) *Land Ownership Adjustment*

State and Native Corporation land entitlements will be met within the planning period, with the BLM retaining management on approximately 15-25 percent of lands currently selected by the State. Once land status is resolved, there will be a demand, both from within and outside the BLM, for land ownership adjustments to improve the manageability of Federal and non-Federal lands.

Land identified for disposal will usually go into private ownership and will be used for its highest and best use (residential, commercial, industrial, or public purposes).

(3) *Transportation and Utility Corridor*

The BLM will continue to manage some portion of the transportation and utility corridor. There will be increased demand to utilize this corridor for additional utilities or infrastructure to support a gas pipeline route.

e) Issue 5: Vegetation Management

(1) *Fire Management*

(a) Wildland Fire

Wildland fire frequency and intensity will increase over the planning period due to fuel build-ups and increasing temperatures. Cooperative interagency fire planning and suppression, as described in Chapter III, will continue. Suppression classes will be changed over time to respond to specific resource or urban-interface concerns.

(b) Prescribed Fire

Prescribed fire will be utilized with more frequency to accomplish habitat improvement and fuels reduction objectives. Prescribed burn treatments will create mosaic patterns on the landscape which would in turn maintain structure and diversity.

(2) *Forest Products*

Opportunities that utilize forest products in return for other resource service work will continue and may increase slightly. Vegetation treatments will improve timber stand quality and quantity. Because of inaccessibility, insects and disease will continue to contribute to the loss of growth in white spruce stands. Local demand for forest products such as firewood and house logs will increase as population in the Copper River Basin increases.

f) Issue 6: Leasable and Locatable Minerals

(1) *Leasable Minerals*

No development of coal or geothermal leases is anticipated within the life of the plan. Oil shale will not be leased and no development of phosphate will occur within the life of the plan. It is unlikely the Copper River coal field would support exploration and development of coalbed methane gas due to low-ranked (lignite) coal deposits.

Oil and gas exploration will occur as described in the reasonably foreseeable development scenario (RFD) (BLM 2004f). The RFD predicts activity based on geologic potential as well as past exploration, accessibility, and lack of existing infrastructure. The following is predicted for Alternative D:

- Five frontier wildcat wells would be drilled during phase one exploration, with an additional three drilled after discovery is made; one of the initial five wells would have an appreciable show resulting in three field delineation wells.
- One gas field likely would be developed. The gas field would initially consist of 10 production wells. Four additional development wells would be drilled with the assumption that two of the total number of wells in the field would be sub economic and thus have short-term impacts. To maximize recovery and minimize waste, production pads would be spaced at distances of about twice the reservoir depth. In the Copper River Basin, for example, a typical 2,500 foot reservoir requiring two production pads would have pads located approximately 5,000 feet apart. Drilling pad footprints have been reduced up to 80 percent from older pad designs by using closer wellhead spacing and by replacing surface mud-reserve pits with storage tanks.
- Typical life of a producing well is 10 to 12 years of gas production; therefore, 1-3 of the 6 gas production wells may be plugged during the planning period. Field abandonment may take from 2-5 years after production ends.
- Approximately 120 miles of transmission pipeline would be needed to transport the gas out of the planning area to the existing pipeline network in the Anchorage/Mat-Su area.
- A compression/gas plant facility would be developed as part of the field's infrastructure.
- One in-field underground injection well would be permitted and installed to dispose of drilling waste, wastewater, spent fluids, chemicals, and the produced water.

This level of development is assumed for the purposes of impact analysis in this Environmental Impact Statement. Actual development may vary considerably based on current gas exploration results, price of oil and gas, accessibility, marketability, and land conveyance. For example, if current gas exploration on private lands in the Copper Basin shows promising results, it is likely that adjacent Native or State-selected lands might become a high priority for conveyance. That being the case, the likelihood of this level of development on BLM-managed lands would be low. Alternative D would “open”

79% of lands currently managed by BLM by removing withdrawals that are currently in place on these lands. However, most of these lands are currently State or Native selected, and because of a segregation against mineral leasing on selected lands, no development would occur on these lands until they are conveyed or the selection is relinquished and the land is retained in long-term BLM ownership.

Alternative D lifts an existing withdrawal against mineral leasing on the eastern 1/3 of the Bering Glacier area. However, this analysis anticipates little to no development during the life of the plan because of poor accessibility, distance from current oil and gas infrastructure, and extreme topography.

(2) Locatable Minerals

(a) Placer Gold

Placer gold mining has been the most common type of mining to occur in the planning area. The RFD for locatable minerals concludes that the historical data indicates that small placer mines will be more likely to reappear in the planning area than either medium or large placer mines (BLM 2004e).

(b) Other Deposits

Intense exploration focused on deposits of rare metals (nickel and platinum group elements) has occurred in the Nikolai Belt area north of the Denali Highway. Exploration results to-date on this area indicate that it has the potential for a significant discovery of these metals. This area has recently been conveyed to the State of Alaska.

If additional exploration leads to the discovery of an economically developable deposit, the deposit will be developed in a similar manner as the Pogo Mine (about 38 miles northeast of Delta Junction). The Pogo project is being developed as a cut and fill underground mine. A detailed mine design and plan have not been developed. Surface disturbance will vary depending on the mine design, construction of roads, power line corridors, selection of tailing disposal method, and other factors. An order of magnitude estimate would be in the range of 800-1,600 acres. Road building, airstrips, and associated material sites account for the largest surface disturbance followed by mine, mill, tailings disposal site, and camp facilities. While most of these disturbances would occur on State lands, some road construction or powerlines would be anticipated across BLM-managed lands.

(3) Mineral Materials

Demand for gravel will increase over the life of the plan as road maintenance and construction continue on State highways, State lands, Native corporation lands, and private lands.

(4) Renewable Energy

Considering such factors as the amount and intensity of sunlight, wind velocity, proximity to roads and electric transmission facilities, and the degree to which State and local policies support renewable energy development, no applications will be received to permit or lease commercial construction of facilities on BLM-managed lands.

g) Issue 7: Subsistence/Social and Economic Conditions

(1) Subsistence

The BLM will continue to play a role in the management of subsistence resources on public lands. The demand for subsistence resources will increase over the life of the plan.

(2) Social Conditions

The population of the State and census area is projected to increase; the only exception to this projection within the planning area is the Valdez-Cordova Census Area, where population levels are expected to remain level, a result of possible loss of employment at the Valdez Marine Terminal which is currently undergoing reconfiguration to address lower Trans-Alaska Pipeline throughput. Population projections are not available for individual communities in the Copper River Basin; however, it is assumed that these populations would grow parallel to the rest of the State.

(3) Economic Conditions

The economic impact analysis is based on BLM-related management changes. Other factors that would affect the local economy, such as population growth, tourism trends, or resource extraction on other lands, are assumed to be the same for all alternatives.

(4) Health and Safety

Public health and safety issues will receive priority consideration in the management of public lands. Demand for safe visits will increase with increasing numbers of public land users.

(5) Tribal Treaty Rights

As a government agency, the BLM will maintain a special government-to-government relationship with Federally-recognized Indian Tribes. Within this planning area, this includes the villages of Mentasta Lake, Chistochina, Gakona, Gulkana, Tazlina, Copper Center, Cantwell, Chickaloon, and Eyak. Residents of these areas utilize Native and Village Corporation lands as well as BLM public lands for traditional subsistence

activities, and will continue to do so. Through this planning process, the BLM has initiated consultation with different village entities. This consultation will continue throughout the planning period.

D. Impacts by Alternative

1. Issue 1: Travel Management

For a detailed description of the Travel Management proposals by alternative, see Table 3 in Chapter II beginning on page 58.

Table 38. OHV Designations by Alternative

OHV Designation	Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Open	6,755,000	96	6,755,000	96	0	0	0	0
Limited to designated trails	196,000	3	196,000	3	3,392,000	48	1,692,000	24
Limited to existing trails	105,000	1	105,000	1	3,369,000	48	5,320,000	75
Closed	0	0	0	0	295,000	4	44,000	<1

* Percent of BLM-managed lands (7,056,000 acres) within the planning area.

a) Impacts Common to All Alternatives

(1) Access

(a) 17(b) Easements

Consistent with ANCSA, the BLM would continue to manage 17(b) easements that access public lands across Native lands. Where 17(b) easements access public lands other than BLM-managed lands, the BLM would attempt to transfer management responsibility of the easement to the appropriate agency. Easement termination would only occur where documented non-use exists and would be subject to public involvement. To ensure maintenance of access to public lands as ANCSA conveyances take place, the Glennallen Field Office staff would recommend the extension of 17(b) easements or reserve new easements as needed. There would be little to no decrease in access currently provided by 17(b) easements.

b) Alternative A

(1) Access

The only areas with any travel restrictions in place are the 196,000-acre Tangle Lakes Archaeological District (TLAD), which was designated as “limited” to OHVs in 1982, and the Delta and Gulkana Wild and Scenic River corridors (with a combined acreage of 105,000 acres), which were designated as “limited to existing trails” for OHVs in 1983. These areas comprise 301,000 acres, or 4 percent of the BLM-managed lands in the planning area. No new travel restrictions would be implemented under Alternative A. Once on public lands, there would be very few limits to access.

(2) OHV Management and Trails

Existing OHV designations would remain in place in TLAD (OHVs limited to designated trails) and trails in the Delta and Gulkana Wild and Scenic River corridors would be designated (OHVs limited to existing trails). Outside of these three areas, the proliferation of unmanaged OHV trails would continue, with a net increase of OHV trails throughout the area. Impacts to trails would continue and development of additional trails on potentially unsuitable soils would create more rutting, trail braiding, thermal erosion, mud bogs, and maintenance needs. The backlog for trail maintenance, even when prioritized based on the worst resource problems, would increase.

(3) Roads

Alternative A would see a slight potential for increase in new road construction associated with mineral exploration and development on State and Native corporation lands. “Slight” increase in this case means an increase in minor gravel roads of 1-10% over what is listed in Table 14. Existing Roads within the Planning Area on page 184. Because of constraints associated with land selection and ANCSA (d)(1) withdrawals, little to no mineral development would occur on BLM-managed lands. Proposed roads would access activities on State and Native corporation lands.

c) Alternative B

(1) Access

Same as for Alternative A.

(2) OHV Management and Trails

Same as for Alternative A.

(3) Roads

This alternative would result in a moderate increase in new road construction associated with mineral exploration and development on BLM-managed lands, as well as forestry activities on BLM-managed lands. Moderate means an anticipated increase in minor gravel roads of 20-40% over what is listed in Table 14. Existing Roads within the Planning Area on page 184. There would also be moderate potential for an increase in new road construction associated with resource development on State and Native corporation lands. Roads on BLM-managed lands would be subject to Required Operating Procedures to minimize impacts. This alternative would result in more potential new road construction than would any other alternative.

d) Alternative C

(1) Access

Alternative C would limit OHV travel to existing or designated trails on 6,768,000 acres (96 percent) of BLM-managed lands, and close 281,000 acres (4 percent) to OHV use. While access to public lands would still be provided, the once unlimited motorized access on public lands would no longer be available, and some areas would not be accessible to motorized users. This alternative is the most restrictive on motorized user's ability to access public lands using motorized means.

(2) OHV Management and Trails

As described in the previous paragraph ((1) Access) for this alternative, OHV travel would be limited to existing or designated trails on all BLM-managed lands, and closed to motorized use on the areas listed above. These designations would minimize the unmanaged proliferation of trails, though some proliferation would still occur, especially on State-selected lands (where OHVs would be limited to existing trails) where specific trail designations and enforcement might not occur unless selections are relinquished by the State and the BLM retains long-term ownership. OHV restrictions would reduce impacts such as rutting, trail braiding, mud bogs, and thermal erosion. Over the planning period, trail designations would allow the BLM to focus maintenance on specific existing and designated trails. While more OHV use might be focused on existing trails as a result of these designations, trail hardening or rerouting would minimize negative impacts over time.

(3) Roads

This alternative would result in very little potential for new road construction due to specific area designations (including ACECs, SRMAs, and RNAs) restricting or prohibiting road construction, as well as the maintenance of most ANCSA (d)(1) withdrawals within those areas with specific designations to provide maximum

protection for resource values. These actions would severely constrain potential for mineral exploration or development. Very little commercial timber harvest or the associated construction of roads to provide harvest access would occur on BLM-managed lands because of the constraints on road construction and on forestry activities.

e) Alternative D (Proposed RMP)

(1) Access

This alternative would limit OHV travel to existing or designated trails on 99 percent of all BLM-managed lands, and close 1 percent of land to OHV use (snowmachines in the Delta Mountains sub-unit). As described in Chapter II, the closure of some specific trails to motorized use would be considered in implementation-level planning in order to meet objectives. While access to public lands would still be provided, the once unlimited motorized access on public lands would no longer be available. This alternative is slightly less restrictive on motorized user's ability to access all public lands using motorized means than Alternative C, and more restrictive than Alternative A or B.

(2) OHV Management and Trails

As described under *Access* in the previous paragraph, OHV travel would be limited to existing or designated trails on 99 percent of all BLM-managed lands. These designations would minimize the unmanaged proliferation of trails, though some proliferation would still occur, especially on State-selected lands where trail designation and enforcement would not occur unless the State relinquished their selection and the BLM retained long-term ownership. OHV restrictions would reduce impacts such as rutting, trail braiding, mud bogs, and thermal erosion, particularly on unencumbered BLM lands where specific trail designations and enforcement would occur as implementation-level planning takes place. Over the planning period, these designations would allow BLM to focus maintenance on specific existing and designated trails. More use might occur on designated trails as a result of these designations, but trail hardening and rerouting would minimize negative impacts over time.

(3) Roads

There would be a slight increase in new road construction under this alternative over the amount of construction that would occur under Alternative A. "Slight increase" in this case means an anticipated increase in minor gravel roads of 5-20% over what is listed in Table 14. Existing Roads within the Planning Area on page 184. No new roads would be permitted within the Gulkana Wild and Scenic River corridor. Road construction would be avoided in all segments of the Delta Wild and Scenic River corridor, but overland transportation systems within or across the river corridor may be authorized if it is determined that there are no economically feasible and prudent alternative routes.

New roads would be permitted subject to seasonal or visual impact restrictions in the Delta bison calving area, Nelchina caribou calving area, West Fork Gulkana area, and Denali Highway area.

2. Issue 2: Recreation

For a more detailed description of the Recreation proposals by alternative, see Table 4 in Chapter II beginning on page 75.

Table 39. Special Recreation Management Area Designations by Alternative

Area	SRMA Acreage by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Delta River	0	0	0	0	44,000	<1	44,000	<1
Denali Highway	0	0	0	0	559,000	8	0	0
Gulkana River	0	0	0	0	105,000	1	105,000	1
Tiekel	0	0	0	0	848,000	12	120,000	2
Delta Range	0	0	0	0	360,000	5	360,000	5
Total	0	0	0	0	1,916,000	27	629,000	9

* Percent of BLM-managed lands (7,056,000 acres) within the planning area.

a) Impacts Common to All Alternatives

(1) Impacts to Recreation from Wild and Scenic River Management

(a) Gulkana Wild and Scenic River Corridor

The Gulkana Wild and Scenic River corridor would continue to be managed under the 1983 River Management Plan for the Gulkana National Wild and Scenic River until a revised river management plan is released in early spring 2006. This revised plan will establish visitor use limits based on monitoring of standards, and prescribe management to address impacts such as human waste, litter, and campsite impacts. The revised plan will maintain ANILCA withdrawals against mineral leasing or locatable mineral entry within the entire Wild and Scenic River corridor. Outstandingly remarkable values for which the river was designated would continue to be protected.

(2) Impacts to Recreation from Vegetation Management

(a) Fire Management

Fire promotes vegetation and wildlife diversity, which can enhance recreation opportunities in both the short- and long-term. Vegetative diversity provides variation in vegetation types, providing variation in form, texture, and color and enhancing scenic qualities. Long-term opportunities for wildlife viewing or hunting may be enhanced by new vegetation growth and improved habitat quality. Negative effects of fire on recreation are generally short-term and are directly related to fire's

effects on specific resources used in recreation, such as recreation facilities. Effects on visual and cultural resources, wildlife, and vegetation would have immediate and direct effects on use of these resources for camping, sightseeing, hunting, and other activities. Recreation users are generally mobile, thus, if recreation is precluded by fire in one area, they generally can find an alternate area in which a similar recreational activity can be pursued. However, smoke thick enough to limit aircraft flights could result in impacts on recreational and commercial activities.

(3) Impacts to Recreation from Mineral Exploration and Development

(a) Oil and Gas Leasing

Oil and gas development has the potential to create impacts to recreation, particularly if development occurs in areas that provide primitive or semi-primitive recreation experiences. Construction of roads, pipelines, powerlines, and other necessary infrastructure would compromise any primitive, semi-primitive, or semi-primitive motorized experience. By creating linear features (such as roads and pipelines) across the landscape, oil and gas development has the potential for significantly impacting visual resources. Public access into areas of development would have secondary effects on adjacent areas by increasing visitor use and leading to the development of additional dispersed campsites and trails. In areas managed for a roaded-natural experience, additional access provided by oil and gas roads could positively affect the recreation experience.

(b) Locatable Minerals

Existing small placer mining operations (disturbing less than five acres) have provided secondary access to recreational opportunities. In areas managed for a primitive or semi-primitive experience, access roads and associated mining infrastructure, even that needed for small operations, would compromise the recreation experience. Large-scale mining operations with associated infrastructure (such as roads and powerlines) would have similar effects to recreation as described under (a) *Oil and Gas Leasing* above.

b) Alternative A

(1) Impacts to Recreation from Travel Management

(a) OHV Management and Trails

Primitive and semi-primitive recreation opportunities would be maintained on lands currently designated for OHVs as “limited” to designated trails (TLAD and the Delta and Gulkana Wild and Scenic River corridors). As all other BLM-managed lands

within the planning area would remain “open” to OHV use, trail proliferation would continue, with increased user conflicts and impacts to visual resources. In these areas, some primitive and most semi-primitive recreation experiences would trend towards semi-primitive motorized or roaded-natural experiences. In the Delta Range area, dispersed snowmachine use would increase and snowmachines would continue to access areas that have traditionally provided non-motorized winter mountaineering and backcountry skiing opportunities.

(b) Roads

This alternative would result in a slight potential for increases in road construction associated with mineral exploration and development on State and Native Corporation lands. Road construction would result in direct and indirect significant impact to primitive recreation experiences. These impacts would occur through increased visitor encounters, the introduction of motorized use into the area, and potential impacts to the visual resource.

(2) Impacts to Recreation from Recreation Designations

No Special Recreation Management Areas (SRMAs) would be designated under Alternative A. The failure to consider the addition of public use cabins to the range of recreational experiences currently available would limit opportunities for those seeking road-accessible and remote backcountry experiences. The strong seasonal demand for public use cabins would not be met.

Current levels of environmental education and interpretation would continue, providing some opportunities to increase public awareness regarding cultural and natural resources, encourage ethical and sustainable use, and establish collaborative working relationships with the State, Native or village corporations, and special interest groups.

(3) Impacts to Recreation from Natural and Cultural Resource Protection

No Areas of Critical Environmental Concern (ACECs) or Research Natural Areas (RNAs), designations that provide measures for the protection of specific resource values, would be designated under this alternative. In general, resource values would be afforded less protection and wildlife viewing opportunities may decrease without the protective measures offered by these designations. No Required Operating Procedures or Oil and Gas Leasing Stipulations would be developed, which could result in direct impacts to resources from permitted activities. Impacts to resources described below would indirectly impact recreation experiences by impacting wildlife and fisheries habitat, water quality, and visual resources.

(4) *Impacts to Recreation from Wild and Scenic River Management*

(a) Delta Wild and Scenic River Corridor

No specific recreation objectives or visitor use limits would be established. With increased visitor use, this lack of objectives and limits would result in the loss of primitive and semi-primitive experiences on the river. Trails would not be designated (except within TLAD, where trail designations already exist and would continue common to all alternatives) so some proliferation of motorized trails within the corridor would occur. Locatable mineral entry would be allowed on 16,000 acres in the scenic segment of the river corridor. With mineral exploration or development occurring in the river corridor, scenic, cultural, and primitive recreation experience values would be difficult to maintain; conversely, access to a semi-primitive motorized experience and subsistence resources would be increased.

Acquisition of lands within the Delta and Gulkana Wild and Scenic River corridors would allow opportunities for more active management of the recreation use that has occurred historically and provide protection of these resources to ensure long-term positive recreation experiences. Consistent with management direction in the 1983 River Management Plans for both the Delta and Gulkana Rivers, both corridors are identified as emphasis areas for land acquisition as willing seller opportunities arise.

(5) *Impacts to Recreation from Lands and Realty Actions*

(a) FLPMA Disposals

No disposals would occur in the Slana area other than those associated with the resolution of unauthorized use. There would be no impact to recreation.

(b) Acquisitions

Under Alternative A, acquisitions would continue to be considered on a case-by-case basis as opportunities arise. Where acquisitions of private inholdings occur, particularly in heavy use recreation areas, they would provide a benefit to recreation by eliminating the potential for private development or limitations on access.

(c) Land Use Authorizations

Rights-of-way, R&PP leases, FLPMA permits and leases, and military permits would be determined on a case-by-case basis. Leases and permits often result in additional developments that may result in significant adverse effects on areas being managed for a primitive recreation experience. These effects may include impacts to visual resources, increased visitor encounters, and a diminished recreation experience. Alternative A would address mitigation of these effects on a case-by-case basis as no area-wide constraints on authorized uses are identified. Therefore,

Alternative A has more potential for negative impacts to recreation than do Alternatives C and D, but less potential than does Alternative B.

(d) Withdrawal Review

Under Alternative A, no withdrawal review would take place and, pending some other legislation, all ANCSA (d)(1) withdrawals would be maintained.

(e) Transportation and Utility Corridor Withdrawals

The transportation and utility corridor would be maintained as under current management. This area would continue to provide roaded natural and semi-primitive motorized recreation opportunities.

(6) Impacts to Recreation from Vegetation Management

(a) Forest Products

Current levels of timber harvest (approximately 40 acres/year) and firewood and house log permitting on BLM-managed lands have little effect on recreation. Existing, temporary, or winter roads are utilized for these activities, and most harvest areas are adjacent to existing roads or highways. Consideration of existing recreation facilities or trails is given on a case-by-case basis, with appropriate buffers provided. The continuation of forestry practices at this level would have little to no effect on recreation.

(7) Impacts to Recreation from Mineral Exploration and Development

(a) Oil and Gas Leasing

No oil and gas leasing would occur under Alternative A; therefore, there would be no effects.

(b) Locatable Minerals

Given existing constraints (ANCSA (d)(1) withdrawals), little potential exists for large scale mining operations to occur on BLM-managed lands, and none could occur on BLM-managed lands within the viewshed of the Denali Highway because of existing ANCSA (d)(1) withdrawals in the Denali Scenic Highway Study Corridor. Given these constraints, no effects to recreation would occur from new development under this alternative.

(c) Mineral Materials

Most gravel pit development occurs within or adjacent to existing highway right-of-ways. Consequently, gravel extraction has little impact on recreation experiences but can negatively impact visual resources. In the planning area, old gravel pits provide de-facto parking areas, motorized play areas, and swimming holes. Given current development levels, no effects to recreation would occur under this alternative.

c) Alternative B

(1) Impacts to Recreation from Travel Management

(a) OHV Management and Trails

Same as for Alternative A.

(b) Roads

This alternative would result in a moderate increase in road construction associated with mineral exploration and development on BLM-managed lands, as well as forestry activities on BLM-managed lands. Road construction would result in direct and indirect significant impacts to primitive recreation experiences. These impacts would occur through increased visitor encounters, the introduction of motorized use into the area, and potential impacts to visual resources. In most areas, the construction of roads would move the recreation experience from primitive, semi-primitive, or semi-primitive motorized to a roaded-natural experience. Roads that access a specific resource development could result in an unmanaged proliferation of trails and satellite dispersed sites around these access points.

Road construction in areas managed for a semi-primitive motorized or roaded-natural experience could provide a positive impact by providing additional access to these areas.

(2) Impacts to Recreation from Recreation Designations

No SRMAs are proposed under this alternative. Generally, recreation objectives within this alternative are to allow existing recreation experiences to trend towards a more developed experience. Increasing visitor use would be addressed through the construction of new facilities rather than through the use of intensive management, establishment of visitor capacity, or regulations.

In general, this alternative would result in existing recreation experiences trending into at least the next class of development along the Recreation Opportunity Spectrum. For

example, many semi-primitive experiences currently available near existing roadways would trend towards semi-primitive motorized or roaded-natural experience. No attempts would be made to maintain primitive experiences, and, given currently increasing user trends, most would trend towards semi-primitive or semi-primitive motorized experiences. The exception would be those areas of BLM-managed lands that are completely inaccessible because of their remote nature (such as the Bering Glacier). Without visitor use limits for commercial and general users in certain areas, recreational experiences and natural resources would be degraded and user conflicts would develop.

Under this alternative, the 135-mile Denali Highway would be designated as a Back Country Byway. This designation would enhance public awareness of the Highway and increase visitation and recreation within the highway corridor and adjoining lands. The potential ramifications of this designation are displacement of traditional uses and users and the need for more developed facilities as proposed to accommodate the potential increase in visitation.

This alternative allows for the indiscriminate placement of public use cabins. This may be a positive impact in some areas, but may compromise recreation objectives in other areas.

Development of additional facilities would redirect recreational use to specific areas, alleviating unmanaged use of other areas while meeting public demand associated with increasing visitation. Establishment of visitor centers and viewpoints would enhance the delivery of environmental education and interpretation opportunities that would increase public awareness regarding cultural and natural resources, encourage ethical and sustainable use, and establish collaborative working relationships with the State, Native or village corporations, and special interest groups.

(3) Impacts to Recreation from Natural and Cultural Resource Protection

Alternative B adopts the Required Operating Procedures and Oil and Gas Leasing Stipulations, but does not designate any ACECs or RNAs. In general, application of Required Operating Procedures and Stipulations would protect relevant and important values, preventing irreparable damage and reducing threats within the affected areas. Measures proposed in order to protect resource values would significantly impact recreation opportunities and experiences, specifically:

- Maintenance of healthy fish and wildlife populations would culminate in enhanced fishing, hunting, and wildlife viewing.
- Protection of cultural resources would provide opportunities for interpretation of cultural and social histories to enhance visitor experiences.
- Healthy watersheds would support a vast array of recreational opportunities for present and future generations.

If no ACECs or RNAs are designated, resource values would be afforded less protection and wildlife viewing opportunities may be decreased. This alternative affords less protection to special values than do Alternatives C and D, but more protection than does Alternative A because of the implementation of ROPs.

(4) Impacts to Recreation from Wild and Scenic River Management

(a) Delta River

Recreation objectives under Alternative B would allow for primitive recreation experiences to trend towards semi-primitive or semi-primitive motorized experiences. No motorized restrictions or horsepower limits would be proposed for the Tangle Lakes. No visitor use limits would be established, which would eventually lead to an increase in user conflicts, degradation of resources at specific points (such as campsites), and displacement of some users. Mineral exploration and development would be allowed to occur within the scenic and recreational portions of the river, which could compromise scenic values as well as the primitive and semi-primitive experiences that currently exist. Overall, this alternative would do the least to protect the outstandingly remarkable values within the river corridor.

(5) Impacts to Recreation from Lands and Realty Actions

(a) FLPMA Disposals

Land disposals in Slana would have little effect on future recreational opportunities as current opportunities are minimal. Land disposals elsewhere within the Glennallen Field Office may have significant effects. Development would likely occur on these disposals, negatively impacting visual resources and altering recreation experiences. By identifying specific tracts for disposal, Alternative B has more potential to impact recreation than does Alternative A.

(b) Acquisitions

No acquisitions are considered under this alternative. In the future, areas with recreation potential may become available that would expand or increase recreation opportunities; failure to acquire these lands may negatively impact future recreation opportunities. By identifying no areas for acquisitions, this alternative closes the door on future opportunities as compared to Alternative A, which identifies the Delta and Gulkana Wild and Scenic River corridors as emphasis areas for acquisitions.

(c) Land Use Authorizations

Rights-of-way, R&PP leases, FLPMA permits, and military permits would be determined on a case-by-case basis. Leases and permits often result in additional developments that may result in significant adverse effects on Wild and Scenic River corridors and primitive recreation experiences. These potential effects may include

impacts to visual resources, increased visitor encounters, and a diminished recreation experience.

(d) Withdrawal Review

This alternative would revoke all existing ANCSA (d)(1) withdrawals, which would allow increased mineral exploration and development on unencumbered BLM lands and on lands currently selected that are relinquished because of over-selection by the State or Native Corporations. For effects of mineral exploration and development on recreation, see discussion below under *(6) Impacts to General Recreation from Minerals Exploration and Development*.

(e) Transportation and Utility Corridor Withdrawals

Alternative B would revoke the transportation and utility corridor withdrawal, which would allow increased mineral exploration and development on unencumbered BLM lands and on lands currently selected that are relinquished because of over-selection by the State or Native Corporations. Revocation would also allow conveyance of the transportation and utility corridor to the State. This would eliminate two of the SRMA designations proposed under alternatives C and D (Delta Range and Tiekel SRMAs) and the areas would be managed by the State of Alaska. Without an emphasis on recreation management in these areas, one could expect, in accessible areas, a trend from primitive and semi-primitive opportunities towards semi-primitive motorized and roaded natural experiences.

(6) Impacts to Recreation from Vegetation Management

(a) Forest Products

The effects of aggressive harvest (100-200 acres/year) of commercial and personal wood products in beetle kill areas have the potential to significantly impact visual resources. These effects, however, can be mitigated through the use of harvest methods other than clear cutting, or through the use of contoured and irregular cutting units. The potential for road development related to the harvest of wood products may be beneficial to recreation in areas managed for semi-primitive or roaded natural experiences if the vegetation management areas are designated using sound and responsible long-term recreational planning objectives. For information on the impacts of road construction on recreation, see the discussion above under *(1) Impacts to Recreation from Travel Management, (b) Roads*.

(7) Impacts to Recreation from Mineral Exploration and Development

(a) Oil and Gas Leasing

This alternative would have the greatest potential of all the alternatives for oil and gas exploration and development given the revocation of all ANCSA (d)(1) withdrawals and the lack of area-wide constraints such as ACEC or RNA designations. The anticipated level of development would be twice that described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines for Leasable Minerals* on page 409, as follows: Ten frontier wildcat wells would be drilled during phase one exploration, with an additional six wells drilled after discovery is made; two of the initial ten wells would have an appreciable show resulting in six field delineation wells.

- Two gas fields likely would be developed. Each gas field would initially consist of 10 production wells. Eight additional development wells would be drilled with the assumption that four of the total number of wells in the field would be sub economic and thus have short-term impacts.
- Typical life of a producing well is 10 to 12 years of gas production; therefore, 2-6 of the 12 gas production wells may be plugged during the planning period. Field abandonment may take from 2-5 years after production ends.
- Approximately 120 miles of transmission pipeline would be needed to transport the gas out of the planning area to the existing pipeline network in the Anchorage/Mat-Su area.
- A compression/gas plant facility would be developed as part of the field's infrastructure.
- Two in-field underground injection wells would be permitted and installed to dispose of drilling waste, wastewater, spent fluids, chemicals, and the produced water.

General impacts from these kinds of development activities are described in *Impacts Common to All Alternatives, Impacts to Recreation from Mineral Exploration and Development* on page 419. Alternative B anticipates the highest level of oil and gas exploration and development of all alternatives, and therefore has the highest level of impacts to recreation.

(b) Locatable Minerals

This alternative anticipates the most exploration and development for locatable minerals given the revocation of all ANCSA (d)(1) withdrawals and the lack of area-wide constraints such as ACEC or RNA designations. Dependent on gold prices, there would be a moderate increase in small placer operations on BLM-managed lands. Large operations are possible during the planning period, but would most likely occur on State lands. Roads or infrastructure necessary for those operations, however, would cross BLM-managed lands. For general impacts to recreation, see *Impacts Common to All Alternatives*.

(c) Mineral Materials

Gravel pit development in support of other resource development activities and road construction is expected to increase under this alternative. Under Alternative B, only the Gulkana Wild and Scenic River corridor and the wild segment of the Delta Wild and Scenic River corridor would be closed to mineral material development. Impacts to recreation would be a result of impacts to visual resources. More de-facto camping and parking areas would develop out of old gravel pits than under Alternative A, thus increasing access points and dispersed recreation areas along the transportation corridor.

d) Alternative C

(1) Impacts to Recreation from Travel Management

(a) OHV Management and Trails

This alternative would be the most effective at maintaining a diversity of recreational experiences across the landscape over time based on stringent measures to regulate OHV use. All areas would be designated as either limited (96 percent) or closed (4 percent) to OHV use, and some areas would be closed to snowmachines. Within areas where OHVs are limited to existing trails (i.e., on State-selected lands), new impacts from OHVs would be only slightly reduced and the unmanaged proliferation of trails would continue to some extent because trails would not be designated and designations would not be enforced until implementation-level planning occurred. The focus for implementation-level planning would be on unencumbered lands, as conveyance may take place for selected lands before implementation-level planning for those lands could occur. Impacts to recreation in these areas would result in a gradual trend away from primitive recreation experiences towards semi-primitive motorized or roaded natural experiences. Within limited designation areas where OHVs are limited to designated trails, the BLM would have the tools to more intensively manage the effects of OHV use by reducing impacts to natural and cultural resources and supporting State of Alaska anadromous stream crossing regulations. Within these areas, primitive, semi-primitive, and semi-primitive motorized recreation experiences would be maintained. Lands that would be closed seasonally to OHV use would provide quiet recreation opportunities. These areas would ensure the maintenance of a primitive or semi-primitive recreation experience. Lands that would be closed to snowmachine use (170,000 acres) would provide quiet recreation opportunities. In the Delta Mountains sub-unit, seasonal closure to snowmachines would ensure maintenance of a primitive non-motorized backcountry skiing and mountaineering experience. Some OHV users may be temporarily displaced during seasonal closures, which may increase use in limited or open areas. This displacement and shifting of use may result in redeployment of management and maintenance oversight to those areas.

(b) Roads

This alternative would result in very little potential for new road construction. Areas closed to road development would preserve ecological integrity, as well as visual resources and existing recreation experiences. The potential for new road construction would be similar to that under Alternative A; however, Alternative C would apply ROPs and area-wide constraints to protect resources.

(2) Impacts to Recreation from Recreation Designations

Five areas totaling 1,916,000 acres would be designated as SRMAs under Alternative C: Delta River (44,000 acres), Denali Highway (559,000 acres), Gulkana River (105,000 acres), Tiekel (848,000 acres), and Delta Range (359,000 acres). These designations would allow for intensive management and preservation of identified high value recreation resources to ensure the protection of visual resources and the maintenance of the recreation experiences currently available. The expanded acreage proposed for inclusion in SRMAs under this alternative as compared with Alternative D, which proposes 629,000 acres for SRMA designation, would afford enhanced protections to the viewsheds and watersheds, preserving high value recreation resources. Increased delivery of environmental education and interpretation would increase public awareness regarding cultural and natural resources, encourage ethical and sustainable use, and establish collaborative working relationships with the State, Native or village corporations, and special interest groups.

The establishment of visitor use limits in specific areas would help ensure the quality of recreation experiences for commercial and non-commercial users while protecting the resources. However, establishment of visitor use limits may limit recreational opportunities for some as well as opportunities for commercial development or expansion for others.

By electing not to develop additional road accessible facilities, the demand for increased developed visitor services and the opportunity to direct visitor use to sustainable locations would be negatively affected. Unmanaged use of undeveloped areas would ultimately increase resource damage, resulting in the proliferation of user-created dispersed camping areas, trails, and waysides. The failure to consider the addition of public use cabins to the range of recreational experiences currently available would limit opportunities for those seeking road-accessible and remote backcountry experiences. A strong seasonal demand for public use cabins would not be met.

(3) Impacts to Recreation from Natural and Cultural Resource Protection

In general, application of resource protection measures (through the establishment of ACECs and RNAs and implementation of ROPs) would protect relevant and important values, preventing irreparable damage and reducing threats within affected areas.

Actions proposed by other programs in order to protect resource values would positively impact recreation opportunities and experiences, as described below.

- Maintenance of healthy fish and wildlife populations would culminate in enhanced fishing, hunting, and wildlife viewing.
- Protection of cultural resources would provide opportunities for interpretation of cultural and social histories to enhance visitor experiences.
- Healthy watersheds would support a vast array of recreational opportunities for present and future generations.
- Active trail inventory and management would curtail trail proliferation, prevent new resource damage, reduce user conflicts, and allow for successful maintenance of visual resources and current recreation opportunities.

(4) Impacts to Recreation from Wild and Scenic River Management

(a) Delta River

Alternative C would provide for management of the Delta River to maintain primitive experiences, which would require a high degree of regulation on visitor use, OHV use within the corridor, and other resource development in the corridor. This alternative would be the most effective at protecting the outstandingly remarkable values for which the Delta Wild and Scenic River was established.

(5) Impacts to Recreation from Lands and Realty Actions

(a) FLPMA Disposals

There would be no land disposals within the Glennallen Field Office other than those associated with resolutions of failed claims in Slana; therefore, there would be no adverse effects.

(b) Acquisitions

The acquisition of lands within the Delta, Gulkana, Denali Highway, and Tielke SRMAs that may become available would allow opportunities for more active management of recreation use than has occurred historically, and would provide for protection of the resources to ensure long-term maintenance of recreation opportunities in these areas.

(c) Land Use Authorizations

R&PP leases and FLPMA permits would not be authorized within any SRMA. Leases and permits often result in additional development. The absence of development would help to maintain existing recreation experiences.

(d) Withdrawal Review

Alternative C would maintain withdrawals on approximately 3 million acres of land, thus preventing minerals development and its associated impacts on recreation.

(e) Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(6) Impacts to Recreation from Vegetation Management**(a) Forest Products**

The effect of prohibiting personal use firewood gathering within the Delta and Gulkana Wild and Scenic River corridors would protect visual resources. However, the quality of the recreation experience may be diminished for those who can no longer gather firewood. The effect of focusing the harvest of commercial and personal wood products on certain areas would result in a concentration of impacts in areas of lower recreation priority. The potential for temporary winter road development related to the harvest of wood products is less under Alternative C than under any other alternative. This use of temporary winter roads may be beneficial to recreation if these areas are designed using sound and responsible recreation planning objectives.

(7) Impacts to Recreation from Mineral Exploration and Development**(a) Oil and Gas Leasing**

Alternative C identifies 4,141,000 acres as being open for leasing. However, 2,322,000 of those acres would only be open subject to major constraints (No Surface Occupancy). The remaining 1,819,000 acres are currently State- or Native-selected. Given these constraints, it is assumed that little to no oil and gas development would occur under this alternative.

(b) Locatable Minerals

Same as for Alternative A. Given the constraints proposed under Alternative C (maintenance of ANCSA (d)(1) withdrawals; designation of ACECs, RNAs, and SRMAs), no change is anticipated from the current situation.

(c) Mineral Materials

Same as for Alternative A. Given the constraints proposed under Alternative C (maintenance of ANCSA (d)(1) withdrawals; designation of ACECs, RNAs, and SRMAs), no change is anticipated from the current situation. The following areas

would be excluded from mineral material sale or development under this alternative: Delta Bison Calving ACEC, Nelchina Caribou Calving ACEC, West Fork ACEC, Delta River SRMA, Denali Highway SRMA, Gulkana River SRMA, Tielke SRMA, and Bering Glacier RNA.

e) Alternative D (Proposed RMP)

(1) Impacts to Recreation from Travel Management

(a) OHV Management and Trails

This alternative would be the second most effective (after Alternative C) at maintaining a diversity of recreational experiences across the landscape over time based on measures to regulate OHV use. Ninety-nine percent of BLM-managed lands would be designated as limited to OHVs, and some areas would be closed to snowmachines. Within areas where OHVs are limited to existing trails (i.e., on State-selected lands), new impacts from OHVs would be only slightly reduced and the unmanaged proliferation of trails would continue to some extent because trails would not be designated and designations would not be enforced until implementation-level planning occurred. The focus for implementation-level planning would be on unencumbered lands, as conveyance may take place for selected lands before implementation-level planning for those lands could occur. Impacts to recreation in these areas would be a gradual trend away from primitive recreation experiences towards semi-primitive motorized or roaded natural experiences. Within limited areas where OHVs are limited to designated trails (24 percent of BLM-managed lands), the BLM would have the tools to more intensively manage the effects of OHV use by reducing impacts to natural and cultural resources and supporting State of Alaska anadromous stream crossing regulations. Within these areas, primitive, semi-primitive and semi-primitive motorized recreation experiences should be maintained. Portions of the Canwell and McCallum Creek drainages (44,000 acres) would be closed seasonally to snowmachine use. Seasonal closure to snowmachines would ensure maintenance of a primitive non-motorized backcountry skiing and mountaineering experience. Some OHV users may be temporarily displaced during the seasonal closures which may increase use in limited or open areas resulting in redeployment of management and maintenance oversight to those areas.

(b) Roads

This alternative anticipates a slight increase in road construction over that anticipated under Alternative A. Areas that are closed to road development would preserve the ecological integrity as well as maintain the visual resources and recreation experiences that exist in the area. Road development may have potential benefits to recreation if the development occurs in areas managed for a roaded

natural or semi-primitive motorized experience. Road construction in areas managed for a primitive or semi-primitive experience would permanently alter that experience by increasing access, resulting in increased use (encounters), proliferation of trails, and satellite recreation sites adjacent to roads.

(2) Impacts to Recreation from Recreation Designations

Four areas totaling 546,000 acres would be designated as SRMAs under Alternative D: Delta Range (276,000 acres), Delta River (44,000 acres), Gulkana River (105,000 acres), and Tielkel (120,000 acres). These designations would allow for the development of comprehensive management strategies, with the identification of specific goals and objectives, that would help preserve high value recreation resources while managing recreation experiences and visual resource impacts. Until those management strategies are in place, interim management for lands within the Denali and Tielkel planning regions would experience a minimal level of recreational management and development, potentially eroding the existing resource values and opportunities. If large contiguous tracts of land are retained in long-term Federal ownership within these areas, more developed recreation could be provided to the public, offering a broader spectrum of opportunities.

Development of additional facilities under this alternative would redirect recreational use to specific areas, alleviating unmanaged use of other areas while meeting public demand associated with increasing visitation. Management objectives for other areas, such as those managed for a primitive experience, could be improved by directing use to more sustainable locations if those areas are selected for the developments. The increased delivery of environmental education and interpretation would enhance public awareness regarding cultural and natural resources, encourage ethical and sustainable use, and establish collaborative working relationships with the State, Native or Village Corporations, and special interest groups.

The addition of public use cabins to the range of opportunities currently available would provide opportunities not only for those seeking road accessible experiences, but also to those seeking a remote, backcountry experience.

The establishment of visitor use limits in specific areas would help ensure positive recreation experiences for commercial and non-commercial users while protecting the resources. However, the establishment of visitor use limits may limit recreational opportunities for some users if implementation-level planning resulting in the use of permit systems.

Areas outside of SRMAs would not receive the management emphasis afforded SRMAs. In accessible areas, this may result in a gradual shifting of recreation experiences to a more developed Recreation Opportunity Spectrum class.

(3) Impacts to Recreation from Natural and Cultural Resource Protection

Where special designations are applied, effects under Alternative D would be similar to those described under Alternative C. However, Alternative D does not provide the level of area-wide protection afforded by Alternative C. Alternative C would designate 1.8 million acres as ACECs and RNAs, while Alternative D would designate 827,000 acres as the Bering Glacier RNA. Protective measures described for permitted activities in the ROPs would apply to both alternatives.

(4) Impacts to Recreation from Wild and Scenic River Management

(a) Delta River

As detailed in Chapter II, recreation objectives would be established to protect and maintain primitive, semi-primitive, and semi-primitive motorized experiences. This alternative would be more effective than Alternative A or B at protecting the outstandingly remarkable values for which the Delta Wild and Scenic River was established. Under this alternative, the BLM would modify PLO 5150 to allow conveyance to the State of approximately 59,000 acres north and west of the Delta River corridor. The State has expressed high interest in these lands because of the high mineral potential in the area. Increased mineral exploration and development in this area would almost certainly result in requests for access across the Delta Wild and Scenic River corridor. These requests would have to be carefully evaluated, consistent with section 1110 of ANILCA, as described in Chapter II of this document (page 51).

(5) Impacts to Recreation from Lands and Realty Actions

(a) FLPMA Disposals

Lands in the Slana area would be available for future disposal to resolve unauthorized use. This would have little to no effect on recreation experiences in the area. Some positive effects could result from clean up of some of the material left on abandoned homesites.

There would be minimal effects from the disposal of small isolated tracts within the Glennallen Field Office, though disposal of some tracts may displace local use within the area.

(b) Acquisitions

The acquisition of lands within the Delta SRMA and Gulkana SRMA that may become available would provide opportunities for a more active management spectrum of recreation use than has occurred historically, and would provide protection of the resources to ensure long-term quality of the recreation experiences

in these areas. Other land acquisitions within the Glennallen Field Office are not a priority and effects to recreation would be minimal.

(c) Land Use Authorizations

All land use authorizations would result in adverse effects on Wild and Scenic River corridors and primitive recreation experience areas. Potential effects may include increased visitor encounters, negative impacts to visual resources, and a diminished recreation experience. Alternative D identifies the Wild and Scenic River corridors as avoidance areas for these authorizations. Other SRMAs land use authorizations (outside the transportation and utility corridor) must be consistent with recreation objectives for the area.

(d) Withdrawal Review

Alternative D would maintain withdrawals on approximately 1.5 million acres, thus preventing mineral development and potential effects to recreation.

(e) Transportation and Utility Corridor Withdrawals

Same as for alternative A. However, Alternative D allows for modification of PLO 5150 to allow conveyance to the State of 83,000 acres north of Paxson. A part of this area (Gunn Creek) is an area on which a portion of the annual Arctic Man ski/snowmachine race is held, an event that attracts as many as 10,000 people and lots of dispersed snowmachine use. Conveyance to the State would not effect the permittee's ability to continue to conduct this activity. Conveyance of these acres to the State would reduce the size of the Delta Range SRMA by 83,000 acres. Without an emphasis on recreation management in these areas, one could expect, in accessible areas, a trend from primitive and semi-primitive opportunities towards semi-primitive motorized and roaded natural experiences. Mineral exploration and development in the area could accelerate this trend and have negative impacts on scenic values in the area.

(6) Impacts to Recreation from Vegetation Management

Alternative D identifies 144,000 acres as being suitable for commercial harvest, with an anticipated annual harvest of 40-100 acres. This harvest of commercial and personal wood products in beetle-kill areas has the potential to impact visual resources. These effects, however, could be mitigated through the use of harvest methods other than clearcutting, or through the use of contoured and irregular cutting units. Temporary road development related to the harvest of wood products may be beneficial to recreation in areas managed for semi-primitive motorized or roaded natural experiences if the vegetation management areas are designated using sound and responsible long-term recreational planning objectives.

(7) Impacts to Recreation from Mineral Exploration and Development

(a) Oil and Gas Leasing

Alternative D anticipates oil and gas exploration and development at the level described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines for Leasable Minerals* on page 409, as follows: Five frontier wildcat wells would be drilled during phase one exploration, with an additional three wells drilled after discovery is made; one of the initial five wells would have an appreciable show resulting in three field delineation wells.

- One gas field likely would be developed. The gas field would initially consist of 10 production wells. Four additional development wells would be drilled with the assumption that two of the total number of wells in the field would be sub economic and thus have short-term impacts.
- Typical life of a producing well is 10 to 12 years of gas production; therefore, 1-3 of the 6 gas production wells may be plugged during the planning period. Field abandonment may take from 2-5 years after production ends.
- Approximately 120 miles of transmission pipeline would be needed to transport the gas out of the planning area to the existing pipeline network in the Anchorage/Mat-Su area.
- A compression/gas plant facility would be developed as part of the field's infrastructure.
- One in-field underground injection well would be permitted and installed to dispose of drilling waste, wastewater, spent fluids, chemicals, and the produced water.

General impacts from these kinds of development activities are described in *Impacts Common to All Alternatives, Impacts to Recreation from Mineral Exploration and Development* on page 419. The impacts associated with oil and gas development under Alternative D would be potentially greater than under Alternatives A and C, and approximately half that of impacts under Alternative B.

(b) Locatable Minerals

This alternative would maintain withdrawals against locatable mineral entry in both the Wild and Scenic River corridors and in the Bering Glacier area (totaling 1,068,000 acres), an area approximately five times larger than that proposed for closure under Alternative B. In areas open to locatable mineral entry, anticipated levels of mining activity and effects to recreation are similar to those described under Alternative B.

(c) Mineral Materials

Mineral material extraction under Alternative D would be prohibited in the Bering Glacier RNA, the Gulkana Wild and Scenic River corridor, and in the wild and scenic

portions of the Delta Wild and Scenic River corridor (though extraction would be allowed in the recreational portion of the Delta corridor). The Denali Highway is identified as an avoidance area. Other gravel pit development would be subject to measures described in the ROPs. Most gravel pit development occurs within or adjacent to existing highway right-of-ways. Consequently, gravel extraction has little impact on recreation experiences but can negatively impact visual resources.

3. Issue 3: Natural and Cultural Resources

For a more detailed description of the Natural and Cultural Resources proposals by alternative, see Table 5 in Chapter II beginning on page 98.

Table 40. Area of Critical Environmental Concern Designations by Alternative

Special Area Designation	Acres and Percentages by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Area of Critical Environmental Concern								
Delta Bison Calving	0	0	0	0	19,000	<1	0	0
Nelchina Caribou Calving	0	0	0	0	389,000	6	0	0
West Fork	0	0	0	0	490,000	7	0	0
Total	0	0	0	0	898,000	13	0	0
Research Natural Area								
Bering Glacier	0	0	0	0	939,000	13	827,000	12

* Percent of BLM-managed lands (7,056,000 acres) within the planning area.

a) Soils

(1) Impacts Common to All Alternatives

(a) Impacts to Soils from Travel Management

1. OHV Management and Trails

Continuous OHV travel over a soil leads to compaction. There are several adverse environmental impacts associated with compaction, including increased soil erosion, increased runoff, increased soil surface strength, reduced vegetation production, alteration in plant succession, reduced soil permeability to air and water, reduced soil moisture, reduction in soil depth and organic matter, reduction of groundwater recharge, alteration of hydrological flows, reduced nutrient cycling, and increased risk of colonization by exotic species.

The most serious and permanent impact from OHVs is soil erosion, with water being the primary displacement mechanism. While soil compaction may recover to some degree during periods of non-use, erosion usually continues whether use stops or not. Most OHVs have powerful motors and deeply treaded tires. When the tires spin they displace large amounts of soil quickly, removing vegetation and topsoil and creating or accelerating ruts. This is especially evident on steep slopes, wetland crossings, and mud bogs. The displaced soil often finds its way into waterways, resulting in increased turbidity

and sedimentation. This can negatively impact water quality and numerous aquatic organisms, including fish species such as salmon that rely on spawning beds that can be covered up by sediment. Displaced soil can also bury down-slope vegetation.

2. Roads

The construction of roads could result in increased soil compaction, soil loss, and erosion. Compaction of native soils could occur through construction activity and excessive vehicle traffic in unpaved areas. Excessive surface water runoff or loss of protective vegetation cover could cause erosion.

(b) Impacts to Soils from Recreation

Most impacts from recreation on soils are related to OHV use, the impacts of which area described above under *OHV Management and Trails* on page 438.

Recreational activities generally do not cause long-term impacts to the soil, but some activities, such as extensive use of camping sites along roadways or rivers, may cause localized impacts that include soil loss and compaction.

(c) Impacts to Soils from Vegetation Management

1. Fire Management

Generally, there should be minimal impacts to the soils in the planning area due to fire. Many of the changes in soil chemical, physical, and biological properties that occur during a fire are related to the degree and duration of soil heating. In low intensity burns there would be enough remaining vegetative material and duff to impair most soil changes. Minor erosion of exposed mineral soil would occur from wind and rain in areas where intense burns create chemical changes through combustion of plant biomass sometimes heating and altering the underlying litter and mineral soil. In soils made up of permafrost and ice lenses where vegetation and duff material are completely burned, there is potential for post-burn thawing. This could result in sluffing and deep erosional channeling, especially in steeper areas. It is expected that post-burn vegetation would recover quickly through sprouting and natural seeding, restoring soil stability and making the erosional impacts to soil short-term in nature.

2. Forest Products

Most harvesting occurs in winter when the ground is frozen and covered with at least 8 inches of snow. This has helped reduce potential severe effects, especially in wet areas, from compaction and erosion. Even with winter soil conditions there is potential to damage vegetation mat and compact soils. In areas with permafrost and ice lenses, disturbance or removal of the duff layer may result in sluffing, especially on steeper slopes. In general, the more

severe the disturbance, the greater the potential for thaw of unstable slopes. Trees, shrubs, and organic mat provide insulation and protect the soils from raindrop fall (splash), surface runoff, and wind erosion. Impacts to soils due to timber harvest at times other than winter and especially when soils are wet could be very disruptive to ecosystems.

(d) Impacts to Soils from Mineral Exploration and Development

1. **Locatable Minerals**

Impacts to soils due to mining would include surface disturbance with removal of duff and vegetation materials; soil compaction; soil erosion through water and wind (dust); and removal of soil profile. Placer mining destroys the structure of the existing soil profile through stripping of overburden. Sometimes reclamation requires recontouring, overburden replacement, and fill placement in excavated areas. The materials used for filling usually do not match the original profile, they do not naturally drain, and are susceptible to further erosion, especially if not contoured or revegetated.

(2) **Alternative A**

(a) Impacts to Soils from Travel Management

1. **OHV Management and Trails**

This alternative would result in the continued proliferation of unmanaged trails. Since there are significantly more acres open to OHVs with no limitations, it is anticipated there would be greater negative impacts to soils under Alternative A than under Alternatives C and D, and the same level of impacts as under Alternative B.

2. **Roads**

Alternative A would result in a slight potential for an increase in road construction associated with mineral exploration and development on State and Native Corporation lands. Existing standard stipulations would apply that minimize the effects of erosion; however, these stipulations are not as effective or protective as the Required Operating Procedures that would be applied under Alternatives B, C, and D.

(b) Impacts to Soils from Recreation

Other than maintenance of facilities, Alternative A makes no attempt to manage recreation activities through the designation of SRMAs, establishing objectives, or establishing visitor use limits for any areas. Impacts to soils would be greater under this alternative than under Alternative C or D, but would be the same as under Alternative B.

(c) Impacts to Soils from Natural and Cultural Resource Protection

No ACEC or RNA designations are proposed under Alternative A. Stipulations for permitted activities would be considered on a case-by-case basis.

(d) Impacts to Soils from Lands and Realty Actions

1. FLPMA Disposals

There would be no impact to soils from FLPMA disposals under this alternative as no additional lands in the Slana area would be made available for disposal other than those required to resolve unauthorized use.

2. Land Use Authorizations

Some permitted or leasing activities have the potential to negatively impact soils. Without the application of the Required Operating Procedures that would be required under all other alternatives, these activities would be more likely to cause adverse impacts to soils under Alternative A than under Alternative B, C, or D.

3. Withdrawal Review

Under this alternative, no withdrawal review would occur and all existing withdrawals would stay in place. Because of the constraints in place under these withdrawals, there would be less potential for resource development and potential soil-disturbing activities than under Alternative B or D.

4. Transportation and Utility Corridor Withdrawals

Alternative A would maintain the transportation and utility corridor withdrawal.

(e) Impacts to Soils from Vegetation Management

1. Fire Management

Alternative A proposes less vegetation management through the use of prescribed fire than does Alternative B or D.

2. Forest Products

Given the current level of forestry activities within the planning area (approximately 40 acres of commercial harvest per year) and assuming the continued use of temporary or winter roads, impacts of forestry activities under Alternative A would be minimal and less than Alternative B or D.

(f) Impacts to Soils from Mineral Exploration and Development

1. **Oil and Gas Leasing**

No oil and gas leasing would occur under this alternative.

2. **Locatable Minerals**

As most BLM-managed lands are currently closed to mineral entry, Alternatives A and C would have less impact to soils from mining activity than would Alternatives B and D.

3. **Mineral Materials**

Mineral material sales would continue to be considered on a case-by-case basis, with specific operating stipulations developed through the NEPA process. The current level of sales is low. Gravel extraction includes removal of topsoil to extract the underlying gravel. Gravel pits can stay open for long periods of time, but reclamation would include recontouring and respreading of topsoil on the site.

(3) Alternative B

(a) Impacts to Soils from Travel Management

1. **OHV Management and Trails**

Same as for Alternative A.

2. **Roads**

This alternative would result in a moderate increase in road construction associated with mineral exploration and development on BLM-managed lands as well as forestry activities on BLM-managed lands. Road construction could result in increased soil compaction, soil loss, and erosion. Compaction of native soils could occur through construction activities, concentrated visitor use, or excessive vehicle traffic in unpaved areas. Construction excavation and replacement of native soils with fills contribute to the reduction of local native soil. Excessive surface water runoff or loss of protective vegetative cover could cause erosion.

Alternative B would allow more road construction than any other alternative; therefore, effects to soils would be greater under this alternative than under Alternatives A, C, and D.

(b) Impacts to Soils from Recreation

Same as for Alternative A.

(c) Impacts to Soils from Natural and Cultural Resource Protection

No special designations, such as ACECs or RNAs, would be considered under this alternative; however, the ROPs and Stips that specifically address minimizing impacts to soil would be adopted for all permitted activities.

(d) Impacts to Soils from Lands and Realty Actions

1. FLPMA Disposals

Under this alternative, there would likely be land development in the Slana area following the disposal process. This development would have a negative impact on soils and vegetation as the surface is disturbed and vegetation is removed because of the construction of access road and structures. Soil loss (through compaction and erosion) per acre of disturbance would increase significantly, causing minor impacts until soils are stabilized, in most cases, through reestablishment of vegetation. This alternative would result in more land disposal than under any other alternative.

2. Land Use Authorizations

Permitted activities have the potential to create short-term soil disturbances; however, the ROPs that would be applied under this alternative would minimize soil disturbances from these activities.

3. Withdrawal Review

Alternative B would revoke most ANCSA (d)(1) withdrawals, which would allow for increased mineral development potential.

4. Transportation and Utility Corridor Withdrawals

Alternative B would allow conveyance of the transportation and utility corridor to the State and would open the corridor to potential mineral development.

(e) Impacts to Soils from Vegetation Management

1. Fire Management

Alternative B proposes approximately 1.5 million acres of prescribed burning for habitat improvement and fuels reduction, the same acreage recommended under Alternative D, and more than recommended under Alternative A or C.

2. Forest Products

Under Alternative B, adoption of the Required Operating Procedures would minimize negative impacts to soils occurring from forestry activities. However, because of the number of acres proposed for potential harvest (100-200

acres/year), and the number of miles of potential new roads needed to access those acres, this alternative has more potential to adversely impact soils than does Alternative A, C, or D.

(f) Impacts to Soils from Mineral Exploration and Development

1. Oil and Gas Leasing

This alternative would have the greatest potential of all the alternatives for oil and gas exploration and development given the revocation of all ANCSA (d)(1) withdrawals and the lack of area-wide constraints such as ACEC or RNA designations. The anticipated level of development under this alternative would be twice that described in the Reasonably Foreseeable Development Scenario, as described above under *Impacts to Recreation from Mineral Exploration and Development, Oil and Gas Leasing for Alternative B* on page 427. The Reasonably Foreseeable Development Scenario itself is described on page 409 under the *Analysis Assumptions and Guidelines* for leasable minerals.

Impacts to soils due to oil and gas production would potentially include surface disturbance with possible removal of duff and vegetative materials; soil compaction; soil erosion through water and wind (dust); and disturbance or removal of soil profile. Seismic operations could affect soils through the action of on-the-ground travel.

If the vegetative layer is removed or disturbed, the soil's insulation protection is then lost. The use of heavy equipment or vehicles has the potential to trample the vegetative layer and reduce insulation. All vehicle use has the risk of removing the vegetative mat. During the summer months soils are more susceptible to disturbance. The disturbed layer may contain large amounts of melt water and the saturated soils may not be capable of resisting the forces of vehicle traffic. In the foothills, where soils are thin or soils are well-drained, or vegetation is otherwise underlain by materials containing less water, vehicle traffic in the summer may result in less disturbance. Generally, frozen soils are capable of supporting the weight of heavy vehicles.

Holes are dug into the earth to construct well cellars (pits in the ground beneath the rig floor), resulting in soil loss and thermokarsting. This type of action would probably make up less than one acre of disturbance during the life of the plan under any anticipated development scenario. In addition, modern cellars often have insulated walls and floors to prevent the melting of surrounding permafrost during well drilling. Development of oil and gas work sites normally involves a long-term commitment of resources which includes sacrificing soils. Soils are destroyed through burial or truncation. Natural soils are completely covered by work pads, camp pads, roads, and pump stations made from sand, gravel, or rock fragments. The soil profile is destroyed by working material sites, conventional pipeline construction, digging, scraping,

and excavating. Off-pad traffic (including foot traffic) and other surface-disturbing activities damage the vegetative cover and surface organic mat. The exposed mineral portion of the soils may erode through wind and water. These activities also alter the thermal balance of the soils, and the risk of thermokarsting increases.

The amount of soil erosion increases with the amount of surface disturbance. The most effective mitigation is to keep the areas of surface disturbance as small as possible using design approaches to minimize the effect to the surrounding area. Under Alternative B, the effects of oil and gas leasing on soils, as described here, would be greater than under Alternative A or C, but would occur at twice the level anticipated under Alternative D.

2. Locatable Minerals

Because this alternative encourages development and presents the least amount of environmental constraints, it would have the greatest potential of all alternatives for direct impacts to soils from mining activities.

3. Mineral Materials

Alternative B anticipates a greater level of mineral material sales than under any other alternative. Where mineral material sales would occur, practices described in the ROPs in Appendix C would be followed. Even with an increase in mineral material sales, application of the ROPs would minimize impacts to soil through appropriate reclamation measures.

(4) Alternative C

(a) Impacts to Soils from Travel Management

1. OHV Management and Trails

Alternative C would have fewer negative impacts on the soil resources than all other alternatives as it closes more acres to OHV use and limits OHVs to designated or existing trails on more acres than any other alternative.

2. Roads

This alternative would result in very little potential for new road construction. Alternative C would have fewer negative impacts on the soil resources than all other alternatives as there are more acres that limit or prohibit road construction in this alternative than in any other.

(b) Impacts to Soils from Recreation

This alternative limits recreational use in specific areas through the establishment of visitor use limits for both general and commercial uses, limiting impacts somewhat in

specific areas. This positive effect could be off-set by the decision in this alternative to not build any additional recreational facilities. Heavy-use areas would consequently see increased impacts to soils, such as the compaction and removal of ground-cover vegetation.

(c) Impacts to Soils from Natural and Cultural Resource Protection

This alternative would designate three ACECs, five SRMAs, and one RNA with specific measures identified to protect resource values. These designations would indirectly benefit soils by restricting development in these areas. This alternative also adopts the ROPs, which contain specific measures for the prevention of soil erosion.

(d) Impacts to Soils from Lands and Realty Actions

1. FLPMA Disposals

No effects.

2. Land Use Authorizations

This alternative identifies specific areas where land use authorizations would be limited to protect specific resource values, resulting in an indirect benefit to soils.

3. Withdrawal Review

This alternative maintains withdrawals on approximately 50 percent of BLM-managed lands, severely limiting development. Maintenance of withdrawals would be an indirect benefit to soils.

4. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Soils from Vegetation Management

1. Fire Management

Alternative C proposes the least amount of use of prescribed fire for habitat improvement or fuels reduction; it relies instead on wildland fire. While fewer acres may burn under this alternative, wildland fires may be more intense due to the build up of fuels, thus resulting in more duff removal and soil erosion.

2. Forest Products

Given the low level of forestry activities that are anticipated, the fact that most forestry activities would utilize temporary winter roads, and the application of

ROPs under this alternative, impacts to soils under Alternative C would be insignificant.

(f) Impacts to Soils from Mineral Development and Exploration

1. Oil and Gas Leasing

Alternative C identifies 4,141,000 acres as being open for leasing. However, 2,322,000 of those acres would only be open subject to major constraints (No Surface Occupancy). The remaining 1,819,000 acres are currently State- or Native-selected. Given these constraints, it is assumed that little to no oil and gas development would occur under this alternative.

2. Locatable Minerals

Alternative C anticipates the same level of locatable mineral exploration and development as does Alternative A, but the application of ROPs under this alternative would minimize impacts to soils from what limited mining activity would occur.

3. Mineral Materials

Alternative C anticipates the same level of mineral material sales as does Alternative A, but the application of ROPs under this alternative would minimize impacts to soils from what limited gravel extraction would occur.

(5) Alternative D (Proposed RMP)

(a) Impacts to Soils from Travel Management

1. OHV Management and Trails

The negative impacts to soils as a result of travel management under this alternative would be less than under Alternative A or B as Alternative D would result in more limits and controls on OHV use than would Alternatives A and B. Overall negative impacts to soils would be slightly greater than those under Alternative C.

2. Roads

This alternative anticipates few proposals for new road construction. Most proposals would be related to accessing private land adjacent to existing State highways. Under this alternative, the potential for increased road construction is less likely than under Alternatives A and B and therefore has a lower potential negative effect on soils. Application of measures identified in the ROPs would minimize adverse impacts from road construction.

(b) Impacts to Soils from Recreation

This alternative would minimize impacts from recreational OHV use by limiting OHVs to existing or designated trails and reducing cross-country travel. Alternative D also sets the framework for establishing visitor use limits in specific areas where impacts to soils are currently occurring (i.e., heavy use of dispersed camping sites causing soil compaction). This alternative also allows for the construction of new recreation facilities in areas of heavy recreation use to minimize the impacts currently resulting from heavy dispersed use. Alternative D would be more effective at minimizing negative impacts on soils than would Alternative A or B, and it would be equally effective as would Alternative C.

(c) Impacts to Soils from Natural and Cultural Resource Protection

The ROPs and Stips listed in Appendix C would be adopted under this alternative, and the Bering Glacier would be designated as an RNA. Alternative D also applies measures in other locations to protect specific resource values, such as seasonal constraints on certain activities in wildlife calving areas. Because of the adoption of specific measures to protect special values, this alternative would be more effective than Alternative A or B at protecting soil resources; it would be less effective at protecting soil resources than Alternative C.

(d) Impacts to Soils from Lands and Realty Actions

1. FLPMA Disposals

Disposal in the Slana settlement area would be used to resolve unauthorized use. Because development already occurs on these parcels, this action would have no effect on soils. In some cases, effects would be beneficial if clean up of abandoned or hazardous materials occurs.

Other disposals would have minimal impacts because of the small scale of the proposals and because development already exists on some tracts.

2. Land Use Authorizations

Alternative D adopts the ROPs listed in Appendix C, which would apply to all permitted activities and application of which would minimize impacts to soils. This alternative also limits leasing or permitting in the Bering RNA, the Delta and Gulkana Wild and Scenic River corridors, and caribou and bison calving areas to protect resource values in those areas. This alternative would be more effective at protecting soil resources from the impacts of land use authorizations than would Alternative A or B, and less effective than Alternative C.

3. **Withdrawal Review**

This alternative would maintain ANCSA (d)(1) withdrawals in the western two-thirds of the Bering Glacier RNA and in portions of the Delta Wild and Scenic River corridor. These withdrawals would prevent mineral leasing and locatable mineral entry. For the effects of mineral exploration and development on soils under this alternative, see *Impacts to Soils from Mineral Exploration and Development* below on page 449.

4. **Transportation and Utility Corridor Withdrawals**

Same as for Alternative A.

(e) **Impacts to Soils from Vegetation Management**

1. **Fire Management**

This alternative would allow for the use of more prescribed fire than would Alternative A or C, and allow for the same amount of use as Alternative B.

2. **Forest Products**

Alternative D anticipates a slight increase in forestry activities on BLM-managed lands, with those activities targeted specifically at the harvest of 144,000 acres of beetle-kill white spruce. Anticipated harvest level would be 40-100 acres/year. Given the forestry constraints that are generally practiced in the area (use of temporary, winter access) and the application of the ROPs that would be adopted under this alternative, the negative impacts to soils from forestry activities would be slight to insignificant.

(f) **Impacts to Soils from Mineral Exploration and Development**

1. **Oil and Gas Leasing**

The anticipated level of development under Alternative D would be at the level described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines* for leasable minerals on page 409.

Alternative D would have more potential impact on soils from oil and gas exploration and development soils than would Alternative A or C, and half the impact that would occur under Alternative B.

2. **Locatable Minerals**

Alternative D anticipates potential mining exploration and development activities at levels less than those anticipated under Alternative B, but more than under Alternative A or C. Compared to Alternative B, no potential development would occur in the western two-thirds of the Bering Glacier RNA,

the inner corridor of the transportation and utility corridor, or in portions of the Delta Wild and Scenic River corridor.

3. Mineral Materials

The application of the ROPs adopted under this alternative would minimize the effects of gravel removal operations. This alternative anticipates gravel removal operations and effects to soils at lower levels than Alternative B, but at higher levels than Alternative A or C.

b) Water Quality

(1) Impacts Common to All Alternatives

(a) Impacts to Water Quality from Travel Management

1. OHV Management and Trails

Major impacts to water quality from OHV use include siltation and disruption of hydrologic systems. Continuous overland OHV use leads to vegetation trampling, soil compaction, and soil erosion. In addition, continuous stream crossings with an OHV can break down the streambed and bank. The consequence of overland travel and stream crossings is increased siltation in the water system. There is a noticeable breakdown of soils resulting from OHV use, and water is the main mechanism to relocate soil. Through erosion, muddy runoff from trails eventually ends up in waterbodies, affecting turbidity.

The hydrology of wetlands and bogs is generally controlled by shallow groundwater, organic soils, flat topography, and vegetation. OHV travel, especially in wetlands and bogs, creates large depressions that change drainage patterns. Many depressions may appear daunting to an OHV rider, who may go around the depression, trampling more vegetation and widening or braiding the trail. These actions can lead to severe erosion and alteration or death of vegetation. Disrupting the soils and vegetation in turn disrupts the hydrological balance.

2. Roads

Road construction negatively alters the hydrology of watersheds through changes in water quantity and quality, stream channel morphology, and ground water levels. Roads increase the amount of impervious surface in a watershed, resulting in substantial increases in peak runoff and storm discharges. When a road bed is raised above the surrounding land surface, as is normally the case, it will act as a dam and alter surface sheet flow patterns, restricting the amount of water reaching downstream areas.

Roads concentrate surface water flows, which can thereby increase erosion potential on road sides and cuts. Water tables are almost always lowered in the vicinity of a road. Culverts and bridges alter flow patterns by diverting natural flow patterns. Channelization removes natural diverse substrate materials, increases sediment loads, lowers the stream channel, reduces the stability of banks, and intensifies downstream flooding.

All roads produce sediment; unpaved roads continue to produce sediment for as long as they remain unvegetated.

(b) Impact to Water Quality from Recreation

Casual recreation uses such as hunting, fishing, camping, boating, and hiking generally do not cause long-term impacts to water quality. Within the planning area, most water quality impacts are associated with human waste disposal along rivers that experience a high volume of users and from water pollution generated by motorized watercraft, particularly those with two-stroke engines.

(c) Impacts to Water Quality from Vegetation Management

1. Fire Management

Wetlands and riparian zones are generally fire resistant except in extreme drought years. The riparian zones of tributaries and major river corridors contain a relatively small amount of volatile vegetation or vegetation that could create an intense type of burn. This would reduce post-burn potential for soil erosion into waterways effecting water quality. The primary effect of fire on water quality would be wind blown materials and rain wash of the exposed burned landscape, and eventual drainage and/or deposit of ashes and soils into the water system resulting in temporary water quality degradation. This is highly dependent on the intensity of the burn, exposure of mineral soil, and how completely materials are burned. The long-term benefits of most burns are an increase in the proportion of younger, more vigorous vegetation and greater soil stability. Fire generally results in long-term stabilizing effects on water quality.

(d) Impacts to Water Quality from Mineral Exploration and Development

1. Locatable Minerals

Possible impacts to water quality from mining would include degradation of water quality through sedimentation and other pollutants, changes in stream geometry, diversion of subsurface water flow, and depletion of water supplies. Thermal effects of construction, both in and out of the floodplain, could affect ground water movement and alter surface drainage. There could be long-term

water pollution from surface runoff and from material piles, along with materials that are potentially spilled such as lubricants for machinery.

(2) *Alternative A*

(a) Impacts to Water Quality from Travel Management

1. OHV Management and Trails

Ninety-six percent of BLM-managed lands in the planning would remain designated as open to cross-country OHV travel under Alternative A, with 4 percent of lands limited to designated or existing trails. No areas would be designated as closed to OHV travel. As a result, both this alternative and Alternative B (which proposes the same OHV acreage designations as does Alternative A) would have the greatest potential for short-term direct negative impacts to water quality resulting from OHV disturbance as compared to Alternatives C and D.

2. Roads

This alternative would result in a slight potential for an increase in road construction associated with mineral exploration and development on State and Native Corporation lands. Stipulations to minimize effects on water quality would be considered on a case-by-case basis. This would not provide the same level of protection as the ROPs that would be applied under Alternatives B, C, and D.

(b) Impacts to Water Quality from Recreation

Other than maintenance of recreation facilities, Alternative A provides no management of recreation activities through the designation of SRMAs, establishment of recreation objectives, or establishment of visitor use limits for any areas (other than the Delta and Gulkana Wild and Scenic Rivers, for which both objectives and visitor use limits have already been established). Impacts to water quality from unmanaged and unlimited recreational activities would be greater than for Alternative C or D, and the same as for Alternative B.

(c) Impacts to Water Quality from Natural and Cultural Resource Protection

There are no ACEC or RNA designations under Alternative A that would offer area-wide protection of resources. Stipulations to minimize effects to water quality from permitted activities would continue to be handled on a case-by-case basis.

(d) Impacts to Water Quality from Lands and Realty Actions**1. FLPMA Disposals**

The Slana disposal would have no impact on water quality because no additional lands would be made available for disposal other than those necessary to resolve unauthorized use. This alternative would have impacts similar to those under Alternative C, but fewer potential for impacts than under Alternative B or D.

2. Land Use Authorizations

Some permitted or leasing activities have the potential to negatively impact water quality. Without a set of ROPs, these activities are more likely to cause adverse impacts to water quality than they would under Alternatives B, C, and D.

3. Withdrawal Review

Under Alternative A, no withdrawal review would occur and all existing withdrawals would stay in place. Because of the constraints in place under these withdrawals, there would be less potential for resource development and potential water quality disturbing activities. This alternative maintains more withdrawals than does any other alternative.

4. Transportation and Utility Corridor Withdrawals

Alternative A would maintain the existing transportation and utility corridor and associated withdrawals, which would prohibit mineral leasing in the entire (both inner and outer) corridor, and prohibit mineral entry in the inner corridor.

(e) Impacts to Water Quality from Vegetation Management**1. Fire Management**

Alternative A would result in less prescribed burning than allowed under Alternative B or D, but more than allowed under Alternative C. Effects on water quality from prescribed fire are generally minimal because burning takes place under a prescription that results in less intense burns, thus less complete loss of duff layer and less potential for erosion into streams and rivers.

2. Forest Products

Given the small area available for forestry activities under Alternative A (approximately 40 acres/year) and the standard practices of winter harvest and travel over frozen surfaces, impacts under this alternative would be insignificant. This alternative would have fewer potential impacts than would Alternative B or D, and more potential impacts than would Alternative C.

(f) Impacts to Water Quality from Mineral Development and Exploration

1. Oil and Gas Leasing

No oil and gas leases would be issued under this alternative; therefore, there would be no impacts to water quality.

2. Locatable Minerals

Under Alternative A, most BLM-managed lands (97 percent) are closed to mineral entry due to withdrawals or selections. However, active placer mining through valid rights does occur. There would be fewer impacts to water quality under Alternative A than under Alternatives B and D, and a similar level of impacts from Alternative C.

3. Mineral Materials

The level of mineral material sales would remain low and all sites would remain located on uplands. There would be effects to water quality as a result of these activities under Alternative A.

(3) Alternative B

(a) Impacts to Water Quality from Travel Management

1. OHV Management and Trails

Same as for Alternative A.

2. Roads

Alternative B would see a moderate increase in road construction associated with mineral exploration and development on BLM-managed lands, as well as increases associated with forestry activities. Because of the amount of anticipated road construction, this alternative would have the greatest potential for direct impacts to water quality resulting from road construction disturbance compared to the other alternatives.

(b) Impacts to Water Quality from Recreation

Same as for Alternative A.

(c) Impacts to Water Quality from Natural and Cultural Resource Protection

Under Alternative B, no ACECs or RNAs would be designed to provide area-wide resource protection. Alternative B adopts ROPs that prescribe measures that would minimize impacts to water quality from road construction.

(d) Impacts to Water Quality from Lands and Realty Actions**1. FLPMA Disposals**

This alternative would make approximately 10,000 acres in the Slana area available for disposal. It is anticipated that land development would follow the disposal process, and that the development would have a negative impact on water quality. During periods of disturbance to vegetation and soils, water quality would be degraded in nearby lakes and streams as turbidity and total dissolved solids (TDS) increase. The amount of increased turbidity and TDS would be a function of the sediment that reaches the water, the volume of water, and the natural amounts of turbidity and TDS. The disposal of lands in this area would also increase the likelihood of hazardous materials being stored and transported in the area, thus increasing the likelihood of spills or leakage through improper storage. This alternative would have more impacts to water quality from FLPMA disposals than would any other alternative.

2. Land Use Authorizations

Some permitted or leasing activities have the potential to negatively impact water quality. This alternative would handle land use authorizations on a case-by-case basis, with no area-wide constraints to protect specific resource values. The ROPs would be applied, minimizing impacts to water quality from permitted activities. This alternative, along with Alternative A, would have the most potential to negatively impact water quality from land use authorizations.

3. Withdrawal Review

The potential effects from revocation of ANCSA (d)(1) withdrawals are detailed in the *Impacts to Water Quality from Mineral Exploration and Development* section on page 456. This alternative would revoke all ANCSA (d)(1) withdrawals to allow for increased mineral exploration and development. This alternative would remove more withdrawals than would any other alternative.

4. Transportation and Utility Corridor Withdrawals

Alternative B would allow for conveyance of the transportation and utility corridor to the State of Alaska. Effects to water quality would be no different than if the corridor were managed by BLM.

(e) Impacts to Water Quality from Vegetation Management**1. Fire Management**

Alternative B proposes up to 1.5 million acres of prescribed burning to improve habitat and reduce fuels, the same acreage for prescribed burning proposed by Alternative D, but more than in proposed under Alternative A or C. Prescribed burns would have minimal effect on water quality because burning occurs

when fire behavior is less intense, less bare ground would be exposed, and erosion into waterways would be less likely than in a wildfire. In addition, prescribed burning on the scale proposed would reduce fuel loading, making large stand-replacement fires less likely.

2. Forest Products

While this alternative proposes the most acres for potential harvest, measures identified in the ROPs (such as buffer areas around riparian areas and use of winter logging) would minimize negative impacts to water quality. Because of the amount of area considered for potential harvest, this alternative has more potential for impacting water quality than does Alternative A, C, or D.

(f) Impacts to Water Quality from Mineral Exploration and Development

1. Oil and Gas Leasing

This alternative would have the greatest potential of all the alternatives for oil and gas exploration and development given the revocation of all ANCSA (d)(1) withdrawals and the lack of area-wide constraints such as ACEC or RNA designations. The anticipated level of development under this alternative would be twice that described in the Reasonably Foreseeable Development Scenario, as described above under *Impacts to Recreation from Mineral Exploration and Development, Oil and Gas Leasing* for Alternative B on page 427. The Reasonably Foreseeable Development Scenario itself is described on page 409 under the *Analysis Assumptions and Guidelines* for leasable minerals.

The extent of the impacts to water resources would depend on location and the nature of existing conditions. Possible impacts due to oil and gas production include thermokarst, drainage disruption, erosion and sedimentation, water removal, gravel removal, pipelines, and spills.

Thermokarst is ground subsidence that occurs when the removal of surface cover exposes ice-rich permafrost to higher temperatures, resulting in melting of the permafrost. Stream banks and lakeshores are particularly vulnerable to thermokarst because the wave action of the water would accelerate the removal of the degrading protective cover. Fine-grained sediments are the most likely to contain ice-rich permafrost, resulting not only in extensive thermokarst but also in increased sediment erosion and changes to stream channel and bed morphology. Many of the streams and lakes in the planning area have banks or shorelines consisting largely of fine-grained lacustrine sediments. Application of ROP-F&W-a-6 (see Appendix C) would minimize any impacts associated with thermokarsting affecting water quality. This measure prohibits any drilling within 500 feet of fish-bearing rivers and lakes.

Natural drainage patterns could be disrupted when oil and gas activities or structures divert, impede, or block flow in stream channels, lake currents, or shallow water tracks. Blockages or diversions to areas with insufficient flow capacity can result in seasonal or permanent impoundments. Diverting stream flow or lake currents can also result in increased bank or shoreline erosion and sedimentation as well as potential thermokarst. Proper siting and adequate design capacity of culverts, bridges, pipelines, and other structures would minimize or eliminate drainage problems.

In addition to thermokarst and drainage alteration, erosion and sedimentation can be caused by construction or other activities that disturb the streambed or stream banks, or that remove protective shoreline vegetation. Inadequate design or placement of structures, culverts, or bridges can alter natural sediment transport and deposit, creating scour holes or channel bars. Improper placement or sizing of gravel fill can result in erosion from pads or roadbeds adjacent to streams or lakes. Winter or low-water construction and transport activities and adequate armoring or fill would minimize erosion and sedimentation problems. Again, these negative impacts would be minimized with application of the ROPs, particularly those that prohibit drilling or provide buffers for riparian areas.

Summer water conditions are usually plentiful; however, depending on precipitation, lakes and riverine pools could be subject to dewatering if consumptive use is high. During the winter, most lakes and riverine pools are subject to dewatering if consumptive use is high. Depending on the areas leased and number of development wells drilled, annual water usage for development activities would vary considerably. Removal or compaction of snow cover can increase the depth of freezing, greatly reducing the water quantity within a lake or pool.

Oil pipelines resulting from development could affect water resources, primarily through temporary impoundments, diversions, and sedimentation during construction. If gas pipelines are also constructed, impacts would be similar. Crude-oil spill cleanup associated with production operations and pipelines is possible and could adversely affect streams and lakes. While the petroleum residue from a spill could be flushed from streams within a few years, the impacts to lakes and ponds could persist for decades. Spill cleanup in a watershed would involve containing the spill, diverting or isolating it within the waterbody, skimming off the oil, and treating the remaining oil-contaminated water and sediments. Prevention and rapid response with adequate removal equipment would minimize effects. Spills of chemicals and saline waters would be rapidly diluted in a large lake or river. In small lakes, tundra ponds, and shallow water tracks, the impacts would be greater, with waters remaining toxic to species sensitive to exposure for several years. These spills could be pumped out of the water body, if confined, or they could be neutralized and then diluted with uncontaminated freshwater.

Under Alternative B, the effects of oil and gas leasing on water quality, as described here, would occur at twice the level anticipated under Alternative D.

2. Locatable Minerals

Because this alternative encourages development and presents the least amount of environmental constraints, it would have the greatest potential for direct impacts to water quality from mining activities. The extent of the impacts to water resources would depend on the location and nature of existing conditions. Possible impacts due to mining could include degradation of water quality through sedimentation and other pollutants; changes in stream geometry; diversion of subsurface water flow; formation of aufice; and depletion of water supplies. Thermal effects of construction, both in and out of the floodplain, could affect ground water movement and alter surface drainage. There could be long-term water pollution from surface runoff and from material piles, along with materials that are potentially spilled such as lubricants for machinery. Application of the ROPs would minimize these impacts, but based on the amount of land made available for mineral development under this alternative, the potential for adverse impacts to water quality is greater than under Alternative A, C, or D.

3. Mineral Materials

This alternative anticipates the greatest amount of gravel extraction in association with increased road construction and mineral development. Improper placement of gravel-removal operations can result in changes to stream channel or lake configuration, stream-flow hydraulics or lake dynamics, erosion and sedimentation, and ice damming and aufeis formation. Locating gravel pits far enough away from streams and lakes to avoid breakup or storm flooding as required by the ROPs would greatly minimize these effects to water resources. Because of the amount of potential gravel extraction anticipated, this alternative has more potential to cause impacts to water quality than does Alternative A, C, or D.

(4) Alternative C

(a) Impacts to Water Quality from Travel Management

1. OHV Management and Trails

None of the BLM-managed lands in the planning area would be designated as open to OHV travel under Alternative C. OHVs would be limited to designated or existing trails on 96 percent of BLM-managed lands, while the remaining 4 percent of lands would be designated as closed to OHV use. As a result, this alternative would have the least potential for direct impacts to water quality resulting from OHV disturbance as compared to Alternatives A, B, and D.

2. Roads

Alternative C would result in fewer negative impacts on the water resources than would all other alternatives as there are more acres where new road construction is limited, and any new roads that would be constructed would be subject to the measures identified in the ROPs.

(b) Impacts to Water Quality from Recreation

By identifying specific areas where visitor use limits will be set, this alternative takes the most aggressive stance of all the alternatives towards regulating recreational activities that could potentially impact water quality. This alternative also proposes the most limitations to cross-country OHV use. Fewer impacts to water quality would be expected under this alternative than under Alternative A, B, or D.

(c) Impacts to Water Quality from Natural and Cultural Resource Protection

Alternative C would designate three ACECs and one RNA, designations that would provide area-wide protection for specific resource values. Because of constraints associated with these designations, the potential for water quality impacts from mineral development, road construction, or other resource development would be minimized. This alternative would also adopt the ROPs, which contain specific measures to minimize impacts to water quality from permitted activities.

(d) Impacts to Water Quality from Lands and Realty Actions

1. FLPMA Disposals

There would be no effects under this alternative because no disposals would occur.

2. Land Use Authorizations

Alternative C identifies specific areas (Wild and Scenic River corridors, some SRMAs where areas are managed for a primitive experience, bison and caribou calving areas, and trumpeter swan nesting areas) where land use authorizations would be limited to protect specific resource values.

Restrictions on authorizations would be an indirect benefit to water quality. Other land use authorizations would be subject to measures identified in the ROPs to protect water quality.

3. Withdrawal Review

This alternative maintains withdrawals on approximately 50 percent of BLM-managed lands. Maintenance of these withdrawals would severely limit development, an indirect benefit to water quality.

4. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Water Quality from Vegetation Management

1. Fire Management

Alternative C identifies the fewest acres for potential prescribed burning of all the alternatives; therefore, impacts to water quality would be minimal. However, lack of prescribed burning could lead to a build up of fuels and higher intensity wildland fires, which would be more prone to intense fire behavior resulting in greater levels of subsequent erosion and water quality impacts.

2. Forest Products

Given the anticipated low level of forestry activities, the use of temporary winter roads, and the application of ROPs (including protection of riparian buffers), impacts to water quality under this alternative would be insignificant. There would be fewer potential impacts to water quality from forestry activities under this alternative than there would be under Alternative A, B, or D.

(f) Impacts to Water Quality from Mineral Development and Exploration

1. Oil and Gas Leasing

Same as for Alternative A.

2. Locatable Minerals

Alternative C anticipates similar levels of locatable mineral development as does Alternative A, but the application of ROPs under this alternative would minimize impacts to water quality from what limited mining activity would occur.

3. Mineral Materials

Alternative C anticipates similar levels of mineral material sales as does Alternative A, but the application of ROPs under this alternative would minimize impacts to water quality from what limited gravel extraction would occur.

(5) Alternative D (Proposed RMP)

(a) Impacts to Water Quality from Travel Management

1. OHV Management and Trails

None of the BLM-managed lands in the planning area would be designated as open to OHV travel under Alternative D. OHVs would be limited to designated and existing trails on 99 percent of BLM-managed lands, while less than 1

percent of lands would be designated as closed to OHV use. Because of these limits and controls on OHV use under this alternative, there would be fewer negative impacts on water quality under Alternative D than under Alternative A or B; negative impacts would be slightly greater under this alternative than they would be under Alternative C.

2. Roads

This alternative anticipates a slight increase in road construction from the current situation. Under this alternative, the potential for increased road construction is less likely than Alternative B and therefore has a lower potential negative effect on water quality. Measures identified in the ROPs would minimize adverse impacts from road construction.

(b) Impacts to Water Quality from Recreation

Alternative D applies measures to minimize impacts from recreational OHV use and identifies areas where visitor use limits will be established where potential impacts to water quality currently occur (Delta and Gulkana Rivers). It also provides for the construction of recreational facilities in areas of heavy recreation use to minimize impacts from heavy dispersed use that is currently occurring. Because of these measures, this alternative would be more effective at minimizing negative impacts than Alternatives A or B, and equally effective at minimizing impacts as Alternative C.

(c) Impacts to Water Quality from Natural and Cultural Resource Protection

The ROPs and Stips listed in Appendix C would be adopted under this alternative, and the Bering Glacier would be designated as an RNA. Alternative D also applies measures such as seasonal constraints in bison and caribou calving areas to protect specific resource values. Because of the adoption of specific measures to protect special values, this alternative would be more effective than Alternative A or B at protecting water quality; it would be less effective at protecting water quality than would Alternative C.

(d) Impacts to Water Quality from Lands and Realty Action

1. FLPMA Disposals

Disposals would be used in the Slana area to resolve unauthorized use. Effects to water quality would be positive where resolution of unauthorized use results in clean up of abandoned property or hazardous materials.

Other disposals would have minimal impacts because of the small scale of the proposals, and because development already exists on some tracts.

2. Land Use Authorizations

This alternative adopts the ROPs that would apply to all permitted activities that would minimize impacts to water quality. Alternative D also limits leasing or permitting in some specific areas, such as the Wild and Scenic River corridors and the Bering Glacier RNA, to protect resource values in those areas. This alternative would be more effective than Alternative A or B and less effective than Alternative C at protecting water quality.

3. Withdrawal Review

This alternative would maintain ANCSA (d)(1) withdrawals in the western two-thirds of the Bering Glacier RNA and in portions of the Delta Wild and Scenic River corridor. These withdrawals prevent mineral leasing or locatable mineral entry. Impacts to water quality from mineral development under this alternative are discussed under the *Impacts to Water Quality from Mineral Development and Exploration* section on page 463. This alternative maintains more withdrawals than does Alternative B, but fewer than do Alternatives A and C.

4. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Water Quality from Vegetation Management

1. Fire Management

Same as for Alternative B.

2. Forest Products

This alternative anticipates a slight increase in forestry activities on BLM-managed lands, targeted at 144,000 acres of beetle-kill white spruce. Anticipated actual harvest level would be 40-100 acres/year. Given the measures identified in the ROPs (use of temporary and mainly winter access and buffers around riparian areas), it is anticipated that negative impacts to water quality from forestry activities would be slight to insignificant.

Alternative D anticipates a slight increase in forestry activities on BLM-managed lands, with activities targeted specifically at the harvest of 144,000 acres of beetle-kill white spruce. Given the application of the ROPs that would be adopted under this alternative (use of temporary roads and mainly winter access, and buffers around riparian areas), negative impacts to water quality would be slight to insignificant.

(f) Impacts to Water Quality from Mineral Exploration and Development

1. Oil and Gas Leasing

The anticipated level of development under Alternative D would be at the level described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines* for leasable minerals on page 409.

Alternative D would have more potential impact on water quality from oil and gas exploration and development than would Alternative A or C, but half the potential impacts than would Alternative B.

2. Locatable Minerals

This alternative anticipates potential mining exploration and development activities and potential impacts to water quality at similar levels as described in Alternative B, but at greater levels than under Alternative A or C.

3. Mineral Materials

This alternative anticipates gravel removal operations at lower levels than would occur under Alternative B, but at higher levels than would occur under Alternative A or C. Measures identified in the ROPs would minimize impacts from gravel-removal operations that could otherwise result in changes to stream channel or lake configuration, stream-flow hydraulics or lake dynamics, and ice damming and aufeis formation.

c) Air Quality

(1) *Impacts Common to All Alternatives*

Under all four alternatives, the anticipated impacts to air quality from resource development and other activities would be negligible to minor. This assumption is based on data from Nuiqsut on the North Slope, where, in addition to village emission sources, several large oil and gas production facilities occur 8-70 miles east of the village. Ambient air quality monitoring in Nuiqsut has shown that air quality is in compliance with National and Alaska Ambient Air Quality Standards (BLM 2004k). No alternative in this analysis anticipates the level of development that occurs at Nuiqsut.

There may, however, be periods of time when smoke from wildland fires exceeds air quality standards. Potential smoke-related problems include effects on individuals with respiratory problems and reduced visibility for aircraft. This short-term impact would apply to all alternatives equally depending on the location, number, and intensity of fires.

d) Vegetation

This *Vegetation* section under *Issue 3: Natural and Cultural Resources* describes impacts to the occurrence and condition of vegetation within the planning area. For information regarding the impacts to the management of vegetation, fire, and forest products, see *Issue 5: Vegetation Management* beginning on page 554.

(1) Impacts Common to All Alternatives

(a) Impacts to Vegetation from Travel Management

1. OHV Management and Trails

The use of OHVs can negatively impact upland and riparian vegetation and all plant species from grasses to trees. Impacts may include crushing, breaking, trampling, reduction of vegetative cover, damage to germinating seeds, or increased erosional forces that alter soil structure and weaken the plant and its roots, resulting in impaired growth or death.

Loss of cover vegetation as a result of OHV use often alters soil temperatures, with negative impacts to soil fauna, soil fertility, nutrient cycling, and hydrological processes. The loss of vegetation increases the likelihood of compaction and erosion. Compaction increases the resistance of the soil to plant root penetration. Compaction also causes the soil to become denser, less porous, and less permeable to water and air. Compaction over large areas inhibits the germination, emergence, and establishment of new plants. Seeds lying on a compacted surface are prone to desiccation and less likely to receive proper incubation and moisture. Erosion of soil through wind and water displaces the soil, making conditions unstable for plant growth. Erosion, especially on steep slopes, can permanently alter the reestablishment of vegetation.

Some individuals traveling cross-country on OHVs have cut down trees and vegetation or branches to facilitate travel. As described above, cross-country OHV use can also disturb natural conditions in soils and vegetation, facilitating the invasion of noxious weeds. OHVs not only create the disturbance conditions in soils and vegetation favoring the spread of noxious weeds, they also carry and spread the weed seed themselves. The spread of noxious weeds by OHVs has been documented in lower 48 states such as Montana and Wyoming.

2. Roads

The effects to vegetation from road construction include the direct removal of vegetation, the fragmentation of habitat and habitat loss, and a facilitation of weed invasions.

(b) Impacts to Vegetation from Recreation

Most impacts to vegetation from recreation are related to OHV use, as described above under *OHV Management and Trails* on page 464. Recreational activities generally do not cause impacts to the vegetation, but some activities, such as extensive and continued use of camping sites along roadways or rivers, may cause localized impacts including vegetation trampling, cutting, and removal.

(c) Impacts to Vegetation from Mineral Development and Exploration

1. Locatable Minerals

Impacts to upland and riparian vegetation from mineral activities would include loss of vegetation and riparian habitat and creation of disturbance conditions in soils and vegetation that would favor the spread of noxious weeds. Equipment used in mining operations may carry and spread weed seeds. Nearby vegetation may be indirectly impacted by dust generated from roads and mining activities. Plant leaves can collect a coating of dust that can interfere with photosynthesis and eventually kill the plant.

(2) *Alternative A*

(a) Impacts to Vegetation from Travel Management

1. OHV Management and Trails

Alternatives A and B would both designate 96 percent of BLM-managed lands as open to OHVs, with 4 percent of the land limited to designated or existing trails. No acres would be designated as closed to OHV use. As a result, these two alternatives have the greatest potential for direct impacts to vegetation resulting from OHV disturbance as compared to Alternatives C and D.

2. Roads

This alternative would result in a slight potential for an increase in road construction associated with mineral exploration and development on State and Native Corporation lands. Stipulations to minimize impacts to vegetation from road construction are considered on a case-by-case basis; however, these stipulations are not as effective or protective as the ROPs that would be applied under Alternative B, C, or D. Based on the anticipated level of new road construction, this alternative would have fewer potential impacts to vegetation from road construction than would Alternative B or D, and more impacts than would Alternative C.

(b) Impacts to Vegetation from Recreation

Other than maintenance of recreation facilities, Alternative A provides no management of recreation activities through the designation of SRMAs, establishment of recreation objectives, or establishment of visitor use limits for any areas (other than the Delta and Gulkana Wild and Scenic Rivers, for which both objectives and visitor use limits have already been established). Because of the lack of established visitor use limits and lack of OHV regulations restricting cross-country travel, impacts to vegetation would be greater under Alternative A than they would be under Alternative C or D; impacts would be the same as under Alternative B.

(c) Impacts to Vegetation from Natural and Cultural Resource Protection

Alternative A would not designate any ACECs or RNAs, thus no area-wide resource protection measures would be implemented. This alternative prescribes measures to minimize impacts to vegetation from permitted activities on a case-by-case basis.

(d) Impacts to Vegetation from Lands and Realty Actions

1. FLPMA Disposals

Disposal of the Slana area under Alternative A would have no impact because no additional lands would be made available for disposal other than those necessary to resolve unauthorized use. There would be fewer impacts to vegetation from FLPMA disposals under this alternative than under alternatives B and D, and more than under alternative C.

2. Land Use Authorizations

Some permitted or leasing activities have the potential to negatively impact vegetation. Under Alternative A, stipulations to minimize impacts to vegetation are considered on a case-by-case basis. Without the application of ROPs, such as those that apply to Alternatives B, C, and D, these activities are more likely to cause adverse impacts to vegetation. This alternative anticipates more land use authorizations than does Alternative C, but fewer than do Alternatives B and D.

3. Withdrawal Review

No withdrawal review would occur under Alternative A, and all existing withdrawals would remain in place. Because of the constraints in place under these withdrawals, there would be less potential for resource development and potential vegetation-disturbing activities. More withdrawals are retained under this alternative than under Alternative B, C, or D.

4. **Transportation and Utility Corridor Withdrawals**

Under Alternative A, all withdrawals associated with the transportation and utility corridor would remain in place. Mineral leasing would therefore be prevented in the entire corridor and locatable mineral development would be prevented in the inner corridor, thus minimizing impacts to vegetation from these activities.

(e) Impacts to Vegetation from Mineral Exploration and Development

1. **Oil and Gas Leasing**

There would be no oil and gas leases issued under Alternative A, therefore, there would be no effects to vegetation.

2. **Locatable Minerals**

Alternatives A and C would have the least impact to vegetation from mining because most BLM lands are currently closed to mineral entry, and would be recommended to remain that way under Alternative C. The potential for locatable mineral development and associated impacts to vegetation is greatest under Alternatives B and D.

3. **Mineral Materials**

This alternative anticipates a continued low level of mineral material sales. There are currently 12 active pits, each less than 5 acres in size. At this level of development, impacts to vegetation are insignificant.

(3) Alternative B

(a) Impacts to Vegetation from Travel Management

1. **OHV Management and Trails**

Same as for Alternative A.

2. **Roads**

This alternative would result in a moderate increase in road construction associated with mineral exploration and development and forestry activities occurring on BLM-managed lands. Alternative B would have the greatest potential for direct impacts to vegetation resulting from road construction disturbance compared to the other alternatives.

(b) Impacts to Vegetation from Recreation

Same as for Alternative A.

(c) Impacts to Vegetation from Natural and Cultural Resource Protection

No ACECs or RNAs would be designated under Alternative B, thus no area-wide constraints would be established for these areas and resource developments could occur, with impacts to vegetation as described under other sections of this analysis. This alternative would adopt ROPs which identify measures for permitted activities to minimize impacts to vegetation.

(d) Impacts to Vegetation from Lands and Realty Actions

1. FLPMA Disposals

It is anticipated that land development would follow the disposal process in the Slana area, and that the development would have a negative impact on soils and vegetation. The vegetative surface would be disturbed and vegetation removed as a result of the construction of access roads and structures. Increased settlement in the area would result in an additional loss of vegetation through the creation of additional trails, more vegetation clearance, and more consumptive use of vegetation (e.g., firewood and berry picking). This alternative would result in more potential impacts to vegetation from FLPMA disposals than would Alternative A, C, or D.

2. Land Use Authorizations

Permitted activities have the potential to disturb vegetation through vegetation removal on a specific site or through removal of a swath of vegetation for rights-of-way. Measures identified in ROPs would minimize disturbance to vegetation associated with land use authorizations. However, this alternative anticipates a high level of land use authorizations associated with resource development. Given this anticipated increase, Alternative B has more potential for impacts to vegetation than does Alternative A, C, or D.

3. Withdrawal Review

This alternative would revoke all ANCSA (d)(1) withdrawals and open these areas to mineral exploration and development, pending State and Native conveyances. More withdrawals are revoked under this alternative than under Alternative A, C, or D.

4. Transportation and Utility Corridor Withdrawals

Alternative B would remove withdrawals and allow for conveyance of the transportation and utility corridor to the State of Alaska. This would potentially allow for mineral development within the corridor, with impacts to vegetation as

described in the following section, *Impacts to Vegetation from Mineral Exploration and Development*.

(e) Impacts to Vegetation from Mineral Exploration and Development

1. Oil and Gas Leasing

It is assumed that exploration or development activities would be more likely to occur in wetland portions of the planning area, such as the West Fork Gulkana area. However, impacts to vegetation from any disturbance from oil and gas production would occur to many different land-cover classes. The effects of exploration and development include the impacts of ice roads or OHVs; the destruction of vegetation under gravel pads, material sites, pipelines, and spilled oil; and the alteration of vegetation communities resulting from dust, salinity of gravel fill, snowdrifts, and blockage of normal surface water flow. The impacts of gravel pads are considered permanent, while those of oil spills, which are cleaned up immediately, allow recovery within a few years to two decades. Most oil spills occur on gravel or ice pads, and consequently, their effects do not reach the vegetation. Overall, past spills on Alaska's terrestrial habitats have caused minor ecological damage, and ecosystems have shown a good potential for recovery, with wetter areas recovering more quickly.

Sensitive Status Species plants in areas of prospective energy development would be subject to the same detrimental effects as described above for common plant species. Where populations are known to exist, Sensitive Status plant species would be provided a buffer from surface disturbing activities as described in the ROPs that would be applied under this alternative. Because of the amount of land made available for mineral leasing under this alternative, it has the most potential to impact vegetation from oil and gas development of all the alternatives.

2. Locatable Minerals

Because Alternative B encourages development and provides the least amount of environmental constraints, it would have the greatest potential of all the alternatives for direct impacts to vegetation from mining activities.

3. Mineral Materials

This alternative anticipates an increase in gravel extraction with increased road construction and mineral development. Impacts to vegetation from gravel extraction are similar to those impacts described above for locatable minerals. This alternative would have the greatest effect on vegetation from gravel extraction than would any other alternative.

(4) Alternative C

(a) Impacts to Vegetation from Travel Management

1. OHV Management and Trails

Alternative C would have fewer negative impacts on the vegetation resources than would all the other alternatives. This alternative designates more acres as closed to OHVs, and there are more acres limited to designated trails.

2. Roads

This alternative would result in very little potential for new road construction. Alternative C would have fewer negative impacts on vegetation resources than would all other alternatives as this alternative limits or prohibits road construction on the greatest number of acres.

(b) Impacts to Vegetation from Recreation

Alternative C identifies specific areas (such as the Wild and Scenic River corridors) where visitor use limits would be established through implementation-level planning. This would limit impacts somewhat in specific areas, but this positive effect could be off-set by the decision to not build any additional recreational facilities. Heavy-use areas consequently would see increased impacts to soils such as compaction and removal of ground-cover vegetation.

(c) Impacts to Vegetation from Natural and Cultural Resource Protection

This alternative would designate three ACECs, five SRMAs, and one RNA, all with specific measures identified to protect resource values. These designations would indirectly benefit vegetation by restricting development in these areas. This alternative also adopts the ROPs, which contain specific measures for protection of vegetation and Sensitive Status Plant Species.

(d) Impacts to Vegetation from Lands and Realty Actions

1. FLPMA Disposals

There would be no effects under this alternative because no FLPMA disposals would occur. This alternative would have fewer effects on vegetation from FLPMA disposals than would any other alternative.

2. Land Use Authorizations

This alternative identifies specific areas where land use authorizations would be limited to protect specific resource values. This would be an indirect benefit

to vegetation. In addition, because of area-wide constraints on resource development, this alternative anticipates less land use authorizations than any other alternative. Consequently, this alternative has less potential to impact vegetation than does Alternative A, B, or D.

3. **Withdrawal Review**

This alternative maintains withdrawals on approximately 50 percent of BLM-managed lands, more than would be maintained under Alternative B or D. This would limit development, resulting in an indirect benefit to vegetation.

4. **Transportation and Utility Corridor Withdrawals**

Same as for Alternative A.

(e) Impacts to Vegetation from Mineral Development and Exploration

1. **Oil and Gas Leasing**

Same as for Alternative A.

2. **Locatable Minerals**

Alternative C anticipates similar levels of locatable mineral development as does Alternative A, but the application of ROPs under this alternative would minimize impacts to vegetation from what limited mining activity would occur.

3. **Mineral Materials**

Alternative C anticipates similar levels of mineral material sales as does Alternative A, but the application of ROPs under this alternative would minimize impacts to vegetation from what limited gravel extraction would occur.

(5) **Alternative D (Proposed RMP)**

(a) Impacts to Vegetation from Travel Management

1. **OHV Management and Trails**

Because there are more limits and controls on OHV use in Alternative D, the negative impacts would be fewer than under Alternative A or B. Negative impacts to vegetation would be slightly greater than the impacts under Alternative C.

2. **Roads**

Alternative D anticipates a slight increase in road construction from the current situation. Under this alternative, the potential for increased road construction is less likely than under Alternative B, and more likely than under Alternatives A

and C, and therefore it has a lower potential to negatively effect vegetation than does Alternative B. The measures identified in the ROPs would minimize adverse impacts from road construction.

(b) Impacts to Vegetation from Recreation

This alternative minimizes impacts from recreational OHV use and identifies specific areas where visitor use limits would be set through implementation-level planning. This would reduce impacts such as vegetation removal and compaction resulting from heavily-used dispersed camping sites. Alternative D also allows for the construction of recreational facilities in areas of heavy recreation use to minimize impacts from heavy dispersed use that is currently occurring. Because of these measures, this alternative would be more effective at minimizing negative impacts than would Alternative A or B, and it would be equally effective as Alternative C.

(c) Impacts to Vegetation from Natural and Cultural Resource Protection

The ROPs and Stips listed in Appendix C would be adopted under this alternative, and the Bering Glacier would be designated as an RNA. Alternative D also applies measures in other locations to protect specific resource values, such as seasonal constraints in caribou and bison calving areas or trumpeter swan nesting areas. Because of the adoption of these measures, this alternative would be more effective than Alternative A or B, and less effective than Alternative C at protecting vegetation resources.

(d) Impacts to Vegetation from Lands and Realty Actions

1. FLPMA Disposals

Disposal in the Slana area would be used to resolve unauthorized use, along with limited disposals for community purposes. In cases of unauthorized use or abandonment, positive effects would result where disposal results in clean-up of abandoned materials.

Other disposals would have minimal impacts because of the small scale of the proposals, and because development already exists on some tracts. Because Alternative D will not result in large scale disposal in the Slana area, it has less potential for disposal and development of homesites than does Alternative B. Consequently, it has less potential to impact vegetation than does Alternative B, and more potential than Alternatives A and C.

2. Land Use Authorizations

This alternative adopts Required Operating Procedures, which would apply to all permitted activities and which would minimize impacts to vegetation. This

alternative also limits leasing or permitting in some specific areas to protect resource values in those areas. Overall, this alternative would be more effective than Alternative A or B and less effective than Alternative C at protecting soil resources.

3. **Withdrawal Review**

Alternative D would maintain ANCSA (d)(1) withdrawals in the western two-thirds of the Bering Glacier RNA and in portions of the Delta Wild and Scenic River corridor. These withdrawals prevent mineral leasing and locatable mineral entry. Effects of mineral development under this alternative are discussed below in the *Impacts to Vegetation from Mineral Exploration and Development* section.

4. **Transportation and Utility Corridor Withdrawals**

Same as for Alternative A.

(e) **Impacts to Vegetation from Mineral Exploration and Development**

1. **Oil and Gas Leasing**

For impacts to vegetation resources from oil and gas exploration and development, see description under Alternative B. Under Alternative D these effects would occur over approximately half the affected area as described in B. Alternative D anticipates a level of oil and gas exploration and development as described in *Analysis Assumptions and Guidelines*, Alternative D would have more potential impact from oil and gas exploration and development on vegetation than Alternative A or C and less than Alternative B.

2. **Locatable Minerals**

This alternative anticipates potential mining exploration and development and effects to vegetation at similar levels as described in Alternative B.

3. **Mineral Materials**

This alternative anticipates gravel removal operations at lower levels than would Alternative B, but at higher levels than would Alternative A or C. Impacts from gravel extraction to vegetation consist of vegetation removal while gravel mining is occurring.

e) Wildlife (Including Sensitive Status Wildlife Species)

(1) Impacts Common to All Alternatives

(a) Impacts to Wildlife from Travel Management

1. Access

Continued access to public lands via the maintenance and/or extension of 17(b) easements across Native and Native-selected lands would have negligible impacts on wildlife habitat and wildlife populations. Improved management of 17(b) easements as specified under all alternatives, would be beneficial to wildlife resources because OHV use by the general public would be limited to the easement, thereby limiting the amount of disturbance and reducing the potential for habitat degradation.

2. OHV Management and Trails

OHVs (including snowmachines) can adversely affect wildlife populations both directly and indirectly. OHVs can magnify the impacts of individual users: the noise, mobility and associated human activity resulting from OHV use are synergistic in that the sum of their effects is greater than the individual effect of each factor (ADF&G 1990). Direct effects occur when wildlife are physically stressed and/or displaced by OHVs to less than preferable habitats. Both stress and displacement may result in a loss of wildlife fitness, productivity, and/or abundance. Changes to the traditional movement patterns, distribution, and expected normal behavior of wildlife can result from exposure to OHVs. (ADF&G 1990).

Indirect effects include habitat alteration and degradation. Wildlife are particularly vulnerable to disturbance at areas of concentration such as mineral licks; calving, lambing, and kidding areas; post-rut and winter range areas; and waterfowl reproduction areas during inherently stressful periods of the year (ADF&G 1990). Refugia, areas inherently inaccessible to humans where wildlife populations could escape from the regular intrusion of humans, are disappearing from the landscape due to the proliferation and unmanaged use of OHVs (ADF&G 1990).

3. Roads

Habitat fragmentation is the division of a continuous habitat or ecosystem into smaller fragments by alteration of the size, shape, or spatial arrangement of habitat types on the landscape-level. Fragmentation of wildlife habitat is caused mainly by human activities such as road construction. The indirect consequences of habitat loss and fragmentation may be less obvious but can result in negative consequences for animal welfare and habitat conservation. At the heart of the fragmentation dilemma is the essential need for expanses of

undeveloped habitat large enough to allow for the maintenance of wildlife population genetic diversity.

(b) Impacts to Wildlife from Vegetation Management

1. Fire Management

Fire is a natural occurrence within Alaskan ecosystems. Generally, the effects of fire on habitat are much more significant than the effects of fire on resident animals. Habitat changes determine the suitability of the environment for future generations of animals. Fires may have a short-term negative impact on resident animals by displacing them, disrupting critical reproductive activities, or, rarely, killing them. However, these animal populations recover quickly if suitable habitat is available. Generally, fire alters habitat and may improve some components for some species while degrading some or all components for others. The adverse effects that the immediate generation of wildlife may experience are usually offset by the benefits accrued for future generations.

Within the planning area, fire is the primary agent of change in the boreal forest and is responsible for maintaining habitat heterogeneity. Wildlife have evolved in the presence of fire and have adapted to its presence. Indeed, the continued well-being of most species of wildlife depends on periodic disturbance of the habitat by fire.

Moose populations usually increase following fire due to increased production of high quality browse in the burned area. However, if the moose population has declined for reasons other than poor habitat, moose may be slow to utilize new habitat created by burning and population numbers may not increase dramatically. Under these circumstances the remaining moose have little trouble obtaining sufficient browse without utilizing the new burn. Use of a burned area would depend largely on whether it is situated in an area traditionally used by moose or through which they migrate. Dispersal to new areas may be slow. If, however, a fire occurs in an area where the moose population is near capacity of the range, then competition for food and social pressures between individuals would result in more rapid exploitation of new habitat created by a fire. The use of burned areas by moose is also related to the amount of available cover. Fires of moderate size or large fires that contain numerous unburned inclusions enhance the edge effect resulting in better moose habitat as compared to extensive severe fires.

The short-term effects of fire on caribou winter range are mostly negative, and include destruction of forage lichens, reduced availability of other preferred species in early post-fire succession, and temporary alterations in caribou movements. However, forage quality of vascular plants are improved by fire. Long-term effects are generally beneficial. Light fires may rejuvenate stands of lichens with declining production. Fire helps maintain diversity in vegetation type, replacing old forest stands where lichens have been replaced by mosses,

thereby initiating the successional cycle that leads to the reestablishment of lichens. Fire creates a mosaic of fuel types that naturally precludes a series of large, extensive fires that may be devastating to caribou habitat. Caribou are nomadic and each herd has historically utilized a range much larger than necessary to meet its short-term food needs. Thus, effects of fire upon the forest system can be accommodated and may be essential to prevent large severe fires that burn huge portions of a herd's range and result in lowering of range carrying capacity.

As stated in Chapter III, fire frequency in the Copper River Basin in the last 50 years has been low. As a consequence, wildlife species such as moose, ruffed grouse, sharp-tailed grouse, and golden-crowned sparrows that are dependent upon early seral stage plant communities have been marginalized in the Copper River Basin due to the lack of vegetation-rejuvenating fire events.

(2) *Alternative A*

(a) Impacts to Wildlife from Travel Management

1. OHV Management and Trails

Under Alternative A, the unregulated use of OHVs on 96 percent of all BLM-managed lands (the remaining 4 percent limit OHV use to designated or existing trails within the TLAD and Delta and Gulkana Wild and Scenic River corridors) would translate to an overall loss of wildlife refugia, further habitat degradation and/or loss beyond the current situation due to mechanical breakdown of vegetation and the potential introduction of invasive plant species. Current OHV management would also lead to continued increasing physical stresses on wildlife populations due to disturbance and displacement from preferred habitats. Alternatives A and B, which propose the same levels of OHV management, would have more potential adverse impacts to wildlife than would Alternative C or D.

2. Roads

As described in Chapter III, proposals for new road construction are rare and are mostly associated with short access routes to private lands. This level of new road construction is expected to continue under Alternative A. Mitigation measures for case-by-case new road construction projects would provide protective restrictions for the benefit of local wildlife and their habitat where necessary.

(b) Impacts to Wildlife from Recreation

Under Alternative A, both commercial and non-commercial recreation would continue to be managed reactively. Consequently, no areas are identified for commercial or non-commercial use limits, and impacts to wildlife associated with

these activities (such as helicopter-supported commercial recreation) would continue to be handled on a case-by-case basis. No recreation facility construction is considered, which could lead to localized habitat degradation at heavy-use dispersed camp sites or user-created waysides along highways. Consequently, this alternative has more potential for impacts to wildlife than does Alternative B, C, or D.

(c) Impacts to Wildlife from Natural and Cultural Resource Protection

Alternative A would be less effective in its ability to provide protective mitigation from permitted activities as none of the ROPs or Stips that would be applied under Alternatives B, C, and D would be adopted under this alternative, though stipulations would continue to be generated based on site-specific analysis.

Under Alternative A, discrete areas of known high value habitat for local and regional wildlife populations (such as the Nelchina caribou calving area, the Delta bison calving area, and the breeding habitat for trumpeter swans and other waterfowl in the wetlands of the West Fork Gulkana watershed) would be particularly susceptible to adverse impacts from OHV use as there would be no specific protective measures (such as OHVs being limited to designated trails) within these areas to protect resource values. No RNA would be designated for the Bering Glacier area, which could leave this area's unique ecological areas vulnerable to impacts from resource development or from unmanaged recreation use or proliferation of OHV trails.

(d) Impacts to Wildlife from Lands and Realty Actions

1. FLPMA Disposals

Under Alternative A, the resolution of failed claims in the Slana area would occur, but no new land disposals would be allowed. Consequently, no habitat degradation or permanent habitat loss associated with land disposal and development of homesites would occur under this alternative. This alternative would have fewer potential impacts to wildlife as a result of FLPMA disposals than would Alternative B or D, and more potential impacts than would Alternative C.

2. Acquisitions

Existing management intent to acquire private inholdings as they are made available to the Federal government within the Wild and Scenic River corridors would curtail further development and conserve wildlife habitat resources therein.

3. Land Exchanges

No land exchanges would occur under Alternative A.

4. Land Use Authorizations

Land use authorizations would continue to be handled on a case-by-case basis under Alternative A. Potential impacts to wildlife from these authorizations would be considered on a site-specific basis and stipulations to minimize impacts assigned as needed. This alternative anticipates fewer requests for land use authorizations than would be received under Alternative B or D, but more than would be received under Alternative C.

5. Withdrawal Review

Under Alternative A, 4,832,000 acres would remain withdrawn from mineral leasing and entry across BLM-managed lands. An additional 2,171,000 acres (1.9 million acres of which are selected) would remain withdrawn from mineral leasing but open for locatable minerals pending conveyance on those lands that are selected. These existing withdrawals would provide a protective constraint against mineral exploration and development and the impacts associated with those activities on wildlife habitat. This alternative retains more withdrawals than any other alternative.

6. Transportation and Utility Corridor Withdrawals

Alternative A would maintain existing withdrawals associated with the transportation and utility corridor. These withdrawals prohibit conveyance of the area to the State and prohibit mineral leasing in both the inner and outer corridor, and prohibit locatable mineral entry in the inner corridor.

(e) Impacts to Wildlife from Vegetation Management

1. Fire Management

Under Alternative A, vegetation treatments for the benefit of wildlife are limited to the improvement of critical moose habitat, especially within the Alphabet Hills area. No other specific areas have been identified for moose habitat improvement using prescribed fire or wildland fire.

2. Forest Products

Mechanical treatments of vegetation, including timber harvest, can mimic some of the beneficial rejuvenating effects of fire. Under Alternative A, small scale timber harvests would occur sporadically as the local demand for wood fiber allowed, and all harvests would be subject to mitigation measures on a case-by-case basis for the benefit of wildlife resources. Harvests would allow for the reestablishment of an early seral stage plant community in a sea of homogenous late seral stage forests.

Special status wildlife species (including Canada lynx, olive-sided flycatcher, Townsend's warbler, blackpoll warbler, and gray-cheeked thrush) that are

dependent on a mature forest setting for all or part of their yearly life cycle could be negatively impacted by large-scale loss of mature habitat.

(f) **Impacts to Wildlife from Mineral Exploration and Development**

1. Oil and Gas Leasing

No oil and gas development would be anticipated under Alternative A.

2. Locatable Minerals

Under Alternative A, most areas within the planning area would remain closed to locatable mineral entry due to selections or underlying ANCSA (d)(1) withdrawals. However, there are some active operations on BLM-managed lands that would continue. Existing placer mining operations are small, with an annual disturbance of less than 5 acres per operation. These operations and any future proposals for locatable minerals exploration and development would be subject to review and standard stipulations through the administration of Plans of Operations. Measures to maintain the integrity of wildlife habitat in these areas would be implemented; and where unavoidable, compensation for habitat loss would be identified and required as part of the individual mine operating plan. This alternative has more potential for impacts to wildlife from locatable mineral development than does Alternative C, and less potential than Alternative B or D.

3. Mineral Materials

Existing gravel pits are generally located within or adjacent to existing rights-of-way; therefore, any additional loss of habitat and wildlife disturbance would be minimal. This alternative anticipates a continued low level of mineral material sales.

(3) Alternative B

(a) **Impacts to Wildlife from Travel Management**

1. OHV Management and Trails

Same as for Alternative A.

2. Roads

This alternative would result in a moderate increase in road construction associated with mineral exploration and development and forestry activities on BLM-managed lands. ROPs for new road construction actions would provide protective measures for the benefit of localized wildlife populations and their habitat where necessary. However, this alternative would also result in the most impacts from road construction associated with habitat fragmentation.

Based on the amount of potential new road construction anticipated under this alternative, it would have more potential impacts to wildlife than would any other alternative.

(b) Impacts to Wildlife from Recreation

Alternative B would allow for the significant expansion of BLM-managed recreational facilities in the Delta Wild and Scenic River corridor, along the Denali Highway, and within the Tielke planning sub-unit to accommodate increasing levels of recreational use. This alternative would also promote increased levels of recreational use and activity for both the general public and commercial recreation ventures as there would be very few limitations or restrictions on OHV use or helicopter-supported recreation. This alternative would have potentially more wildlife impacts from recreation than would Alternatives C and D, and fewer impacts than Alternative A.

(c) Impacts to Wildlife from Natural and Cultural Resource Protection

Under Alternative B, most ANCSA (d)(1) withdrawals would be revoked to allow for the greatest potential for mineral exploration and development. Consequently, high value wildlife habitat areas previously protected under the umbrella of existing ANCSA (d)(1) withdrawals would be made available to mineral exploration and development, but all permitted activities would be subject to the ROPs and Stips listed in Appendix C.

In general, ROPs provide detailed and quantified measures for the temporal and/or spatial protection and conservation of wildlife habitat (and other resource values) on a case-by-case basis. Areas of high value wildlife habitat, such as parturition areas for the Nelchina caribou herd, the Delta bison herd, moose, raptors, Dall sheep, mountain goats, waterfowl, and those species of wildlife considered Sensitive Status Species, and areas such as winter ranges would receive protection only during the season of critical wildlife use; otherwise, permitted activities could occur within these critical habitats subject to site-specific mitigation measures and outside of the critical seasons. No RNA would be designated for the Bering Glacier area. Impacts to the Bering Glacier would be the same as described under Alternative A on page 477.

(d) Impacts to Wildlife from Lands and Realty Actions

1. FLPMA Disposals

Under Alternative B, approximately 10,000 acres of undeveloped and relatively uninhabited land would be made available for further homesite development in both the north and south Slana blocks. Land disposal under this alternative could range from a maximum development of 2,000 5-acre homesites to a minimum development scenario of 250 5-acre homesites. Of the total 7.1 million acres managed by the BLM, disposal of 10,000 acres within the north

and south Slana blocks would result in degradation and/or permanent loss of wildlife habitat on 0.14 percent of the total land base.

Local wildlife species directly or indirectly affected by disposals (through displacement from preferred habitats, habitat loss, and habitat fragmentation) would include black bears and grizzly bears within their general range, bald eagles within their seasonal breeding habitat, the Nelchina caribou herd within its traditional winter range, moose within their seasonal winter range and general year-round use range, and trumpeter swans within their seasonal breeding habitat. These impacts would affect individuals, not the long-term viability of populations for any of the species listed in this paragraph.

Other disposals would affect local populations of Sensitive Status Species, such as Canada lynx and certain migratory birds, which may be permanently displaced from preferred habitats (both seasonally for breeding purposes and yearlong for less critical life phases). However, these negative impacts are not expected to affect local wildlife populations or their habitats due to the discontinuous nature and small acreages (less than 100 acres total) of land under consideration for disposal. This alternative has more potential for impacts to wildlife through FLPMA disposals than does Alternative A, C, or D.

2. Acquisitions

By not pursuing the acquisition of available private inholdings within the Delta and Gulkana Wild and Scenic River corridors or within the proposed Bering Glacier RNA, private entities may further develop their properties for commercial profit, thereby increasing the levels of human activity within otherwise mostly intact and unfragmented wildlife habitat. Local populations of wildlife in close proximity to development may be potentially disturbed and/or displaced.

3. Land Exchanges

Alternative B would not consider land exchanges until all State and Native entitlements are met. After that point, the potential for land exchanges benefiting both parties would increase the effectiveness of habitat management by enabling resource managers to apply maintenance or enhancement actions on more consolidated or contiguous blocks of land.

4. Land Use Authorizations

Alternative B anticipates the greatest number of land use authorizations associated with increased resource development. Impacts to wildlife would be minimized through application of the ROPs that would be adopted under this alternative.

5. Withdrawal Review

Under Alternative B, 7,003,000 acres of BLM-managed lands would be made available to all forms of mineral leasing and entry. However, 5.5 million of these acres are currently encumbered by State or Native selections and no mineral development would occur until the lands are conveyed or the selection relinquished back to the BLM. All development would be subject to review and application of the ROPs and Stips. The following areas would be protected from disturbance during periods of sensitivity with a timing and/or spatial restriction: parturition areas and winter range for big game species, waterfowl production and molting habitat, and other specialized habitats (e.g., mineral licks) and known critical habitats of Sensitive Status Species (e.g., Canada lynx and certain migratory birds).

Specific effects to wildlife from mineral development are discussed in the *Impacts to Wildlife from Mineral Exploration and Development* section below on page 483. This alternative revokes more withdrawals than any other alternative.

6. Transportation and Utility Corridor Withdrawals

This alternative provides for the revocation of PLO 5150 to allow for mineral entry and to allow for State of Alaska selection for conveyance of the transportation and utility corridor, actions that would have long-term adverse impacts on wildlife habitat resources in the area.

Allowing for mineral entry within both the inner and outer corridors of the transportation and utility corridor would open up 434,000 acres to potential exploration and development. If development were to occur, it could impact the following acreages within the transportation and utility corridor: 13,000 acres of bison calving range along the Delta River (87 percent of the range); 136,000 acres of Dall sheep range (12 percent) on slopes within the Alaska Range and Chugach Mountains; 140,000 acres of moose winter range (10 percent); 42,000 acres of moose calving range (5 percent); 107,000 acres of caribou winter range (2 percent); 19,000 acres of trumpeter swan breeding habitat (7 percent); and 59,000 acres of bald eagle breeding habitat (8 percent). All proposals for mineral entry or leasing would be subject to review and application of ROPs and Stips for the protection of wildlife populations and their habitat. Alternatives A, C, and D would retain withdrawals associated with the transportation and utility corridor.

(e) Impacts to Wildlife from Vegetation Management

1. Fire Management

Alternative B proposes as much habitat improvement through prescribed fire as does Alternative D, and more than does Alternative A or C. Continuance of a

prescribed fire program in the Alphabet Hills would improve habitat conditions, particularly for moose, by maintaining a lower-seral shrub-dominated plant community in burned areas. Lack of prescribed fire in other areas would allow for continued dominance of late-seral black or white spruce cover types and an aging and unproductive shrub component.

2. Forest Products

Under Alternative B, the proposed increase in timber harvest in areas heavily affected by the spruce bark beetle infestation, and the associated road building that would be necessary for timber removal, would have both beneficial and adverse effects on wildlife habitats. Wildlife species that are directly or indirectly dependent upon early seral stage plant communities would benefit from the increased vegetation treatments on a broader landscape level, as would wildlife species that thrive in the presence of diverse micro-scale habitats in close proximity to each other or within edge habitats.

Wildlife species (including pine marten, chickadee, white-winged crossbill, northern goshawk, black-backed woodpecker, boreal owl, great gray owl, great horned owl, Townsend's warbler, and olive-sided flycatcher) that prefer mature spruce forests for all or a portion of their annual life cycle would be adversely affected by the increased timber harvest, as would species (including black-backed woodpecker, olive-sided flycatcher, great gray owl, and boreal owl) that are dependent upon standing dead trees for insect foraging, cavity nesting and roosting, perching, and hawking.

Timber harvest necessarily entails increased human activity and disturbance, and increased road construction for access to the timber. As outlined in Alternative A under *Impacts to Wildlife from Travel Management* on page 476, motorized access can be detrimental to wildlife and their habitat, often displacing wildlife from preferred habitats, contributing to the physical stresses on wildlife, degrading the quality of habitat (via mechanical breakdown of vegetation, increased sedimentation in nearby streams and wetlands, introduction and proliferation of invasive plant species, and habitat fragmentation), and contributing to the potential reduction in the amount of existing wildlife refugia.

The ROPs adopted under this alternative would ensure that timber harvest would provide for the conservation of valuable wildlife habitats or adequately compensate for their degradation.

(f) Impacts to Wildlife from Mineral Exploration and Development

1. Oil and Gas Leasing

Under Alternative B, 5,195,000 acres of BLM-managed lands (74 percent) would be available to leasing for oil and gas activities subject to the terms and

conditions of the standard lease form, pending conveyance of selected lands (4.7 million acres) to State and Native entities. BLM lands open to oil and gas leasing, but subject to minor constraints such as seasonal restrictions for the benefit of wildlife resources, include a total of 1,724,000 acres (24 percent); of these, 898,000 acres are selected by either the State or Native Corporations. The wild portions of the Delta and Gulkana Wild and Scenic River corridors, totaling 137,000 acres (2 percent), would not be open to oil and gas leasing. Under Alternative B, there would be no areas (0 acres) that would be subject to a No Surface Occupancy requirement.

In general, Alternative B represent a 100 percent increase in the amount of lands open to oil and gas leasing as compared to Alternative A.

The development and production of oil and gas is multi-phased (beginning with *exploration through development, production, and abandonment and rehabilitation*), lasting from a minimum of one year for no show of oil or gas at exploratory sites, up to a maximum of 44 years for productive wells that have been exhausted and finally reclaimed. The potential for adverse effects from oil and gas activities to wildlife resources are of equal scope and complexity. In general, the potential for (noise and visual) disturbance and displacement from preferred habitats (during any season of the year), temporary or permanent loss of habitat, habitat fragmentation, loss of individual fitness, or individual mortality (direct or indirect) is expected. Potentially, the adverse effects from oil and gas activities on wildlife would be moderated by implementation of the ROPs and Stips, and by implementation of site-specific mitigation measures for each activity. Oil and gas activities would therefore not be expected to have detrimental population-level effects to any species of wildlife, including birds, terrestrial mammals, marine mammals, and Sensitive Status Species.

Alternative B anticipates twice the level of exploration and development activity as is predicted in the Reasonably Foreseeable Development Scenario as described above under *Impacts to Recreation from Mineral Exploration and Development, Oil and Gas Leasing* for Alternative B on page 427. The Reasonably Foreseeable Development Scenario itself is described on page 409 under the *Analysis Assumptions and Guidelines* for leasable minerals.

Exploration and development of oil and gas fields could occur throughout the year while adhering to the terms and conditions of the standard lease form as well as the ROPs and Stips. If activities were to take place during the winter months when the majority of bird species within the planning area have migrated south to wintering areas, there would be no direct to the birds. However, bird habitats would be directly affected by the development of access roads (either gravel or ice) and/or gravel pads for wells and all associated human activity on a localized level. A limited number of yearlong resident birds such as the common raven, great gray owl, boreal owl, northern hawk owl,

ptarmigan species, grouse species, and other resident passerines could be disturbed and temporarily displaced from localized preferred foraging habitats by oil and gas activities during the exploration and development phase. Exploration and development activities that continue into the warmer months of the year could affect migratory bird species as they return to Alaska for the breeding and brood-rearing season, but such exposures are not expected to have any population level effects due to the implementation of ROPs, Stips, and site-specific mitigation measures that would minimize adverse impacts and/or restrict activities during the critical breeding/brood-rearing season.

Water withdrawn from nearby lakes for the construction of ice roads in winter would alter water levels and adjacent habitats; however, water recharge during the spring thaw would minimize adverse effects to the aquatic invertebrate populations utilized by migratory birds and the potential for long-term adverse effects.

Impacts to terrestrial mammals would also be expected during the exploration and development phase from motor vehicle, foot, and aircraft traffic; seismic operations; oil spills; gravel mining; and construction within a localized, 1-mile perimeter of these activities. The primary impacts to mammals would likely be associated with visual and audible disturbance, displacement from preferred habitats, habitat alteration (associated with gravel placement for access roads and pads for well sites), and habitat fragmentation (see also the fragmentation discussion on page 474 under *Impacts Common to All Alternatives, Impacts to Wildlife from Travel Management, Roads*). Movements of the Nelchina caribou herd while on their calving grounds in the eastern Talkeetna Mountains and wintering moose on critical winter ranges may be affected by exploration and development activities during winter (and late winter) months, but these discrete areas would be protected by the proposed ROPs and Stips. Omnivorous predators like grizzly bear, black bear, red fox, and coyote may potentially be attracted to oil and gas developments where human food stuffs and garbage are available, thereby bringing these mammals into direct conflict with the safety of oil and gas field workers; however, proper handling of human foods and generated wastes would greatly reduce or eliminate this potential conflict.

According to the Reasonably Foreseeable Development scenario, depending upon the results of the exploratory activities, construction of approximately 120 miles of new pipeline may be necessary to transfer the petroleum to distant refinery facilities. Large mammals, especially caribou, are known to hesitate before crossing under an elevated pipeline for periods of time ranging from several minutes to a few days. Construction of below-ground pipelines, wherever possible (dependent upon the absence of local permafrost), is highly desirable to eliminate adverse effects to the natural movements of caribou and moose. However, it is expected that the mere physical presence of above-ground pipelines would have a minimal adverse effect on the behavior,

movement, or distribution of wildlife and would not be expected to have adverse population-level effects to these species.

Winter exploration and development in the Bering Glacier area would have no foreseeable adverse effects to marine mammals. The north Gulf Coast harbor seal population (a BLM Sensitive Status Species) is known to peak in its abundance in Vitus Lake (in the foreground of the Bering Glacier) during the month of September when prey is most abundant. Alaska's total harbor seal population is estimated at between 200,000 and 300,000 animals. For most of the year, however, fewer than 200 seals have been observed hauled out on Vitus Lake icebergs (Saverese and Burns 2004).

The Reasonably Foreseeable Development scenario predicts that given the typical life of a producing well (10-12 years for gas and 30 years for oil), two to six of the potential ten gas production wells would be plugged during the planning period. The production phase of oil and gas activities would have similar impacts as described above for the exploratory and development phase, but would be of longer duration. Habitat alteration, loss, and fragmentation would be long-term for well sites that are in full production; however, localized production wells are generally no larger in size than 2-4 acres each per 640-acre gas field. Access roads to full production wells typically average two miles per 160 acres. Wildlife become habituated to long-term routine and predictable human activities and associated disturbances, and are capable of normal daily and lifelong processes and functionality without undue adverse effects to individuals or populations.

Due to the documented extensive replacement of and conversion from valuable wetland habitat to open water as associated with producing oil and gas fields in the Gulf of Mexico region of the United States, the implications of hydrocarbon production-induced wetlands subsidence within the planning area is a significant concern. As stated in a Fact Sheet prepared by the U.S. Geological Survey regarding wetland subsidence,

When large volumes of oil, gas, and associated formation water are extracted from the subsurface, the natural pressures in the reservoirs are reduced and stresses around the reservoir increase. The increased stresses cause reservoir compaction, which, in places, leads to surface subsidence (USGS 2001).

Fluid hydrocarbon production is inherently concentrated within specific field areas, but the potential for the depressurization effect extends far beyond the individual fields. "Where multiple fields are producing from the same strata, regional depressurization can cause subsidence and wetland losses in the areas between the fields" (USGS 2001). Wetlands habitat comprise roughly 3.9 million acres (55 percent) of the planning area, and 1.4 million of those acres (20 percent) are managed by the BLM. These wetlands, regardless of

ownership, support large volumes of waterfowl reproduction in southcentral Alaska; of particular concern are those wetlands within the Clearwater block, the West Fork Gulkana watershed, and the foreground of the Bering Glacier. Wetland subsidence would have significant adverse effects on waterfowl production, especially those species considered Sensitive Status Species such as the trumpeter swan, dusky Canada goose, tule white-fronted goose, and Vancouver Canada goose.

The Reasonably Foreseeable Development scenario for the Bering Glacier region predicts there is high potential for the generation of oil and gas, but low development potential. Under Alternative B, BLM-managed lands within the Bering Glacier region would be open for oil and gas activities. The BLM-managed lands in this region are subject to the influences of the Gulf of Alaska, and, at their nearest point to marine waters, are approximately 3 miles distant in the Malaspina Glacier and the White River Glacier areas, and 6 miles distant in the Suckling Hills area. In 2004, the U.S. Fish and Wildlife Service named the Kittlitz's murrelet (*Brachyramphus brevirostris*), a seabird typically found in glacial-fed marine waters, as a candidate for listing under the Endangered Species Act. Recent Section 7 Consultation with the U.S. Fish and Wildlife Service (FWS 2004) indicates that the murrelet may be found offshore of the Bering Glacier and Malaspina Glacier. In addition, harbor seals are known to swim up the Seal River and haul-out on icebergs in Vitus Lake (in the foreground of the Bering Glacier) yearlong. Several other Sensitive Status Species, including dusky Canada goose, Vancouver Canada goose, tule white-fronted goose, red-throated loons, Canada lynx, and trumpeter swan, are known to occupy parturition habitat in Vitus Lake and the terrestrial foreground of Bering Glacier.

Generally, marine mammals and birds in the northern Gulf of Alaska, especially harbor seals and Kittlitz's murrelet, would be protected from oil and gas activities that would occur in the area under Alternative B due to the extent of the land buffer between BLM-managed lands and the coastline. In addition, ROPs, Stips, and site-specific seasonal and temporal mitigation measures would ensure adequate habitat protections, ensuring leasing activities would not lead to adverse population-level effects. Consequently, there would be no adverse effect to any Sensitive Status Species or other wildlife species and their habitat in the area.

Abandonment and rehabilitation of dry exploratory wells and formerly active oil and gas wells generally lasts from two to five years per site, with restoration of the surface area being most beneficial to wildlife resources. Among other abandonment activities such as plugging and capping of the well, reclamation includes recontouring of the area to match the natural lay of the land, stabilization of the soil, possible addition of fertilizer to hasten the vegetation regrowth, and reseeding with native plant seed mixtures. Motorized human activities are necessarily associated with the abandonment and rehabilitation

phase, but are relatively short-term. Overall, this final phase of oil and gas activities denotes the coming conclusion of disturbance and displacement of wildlife from formerly preferred habitats, and the reestablishment of early seral stage native plant communities. As with the expected effects associated with oil and gas production, it is not expected that abandonment and rehabilitation activities would jeopardize the viability of any wildlife population, including those species considered Sensitive Status Species by BLM-Alaska. Standard Lease Terms, Lease Stipulations, ROPs, and site-specific mitigation measures would ensure the integrity of critical habitats during critical seasons of use.

2. Locatable Minerals

Alternative B proposes the opening of 6,919,000 acres (98 percent) of BLM-managed lands for locatable mineral activities; of this amount, 5.5 million acres are selected by either State or Native entities for conveyance. A total of 137,000 acres (2 percent) within the wild portions of the Delta and Gulkana Wild and Scenic River corridors would be closed to all locatable mineral activities under this alternative. Alternative B represents a 95 percent increase in the amount of lands open to locatable mineral activity over that available under Alternative A. However, mineral exploration and development would not occur on all lands that are available.

The opening of the majority of BLM-managed lands to locatable mineral mining would result in the same adverse effects described above for oil and gas activities beginning on page 483. Locatable minerals mining would necessitate the need for road construction, infrastructure development, and significant increases in the volumes of motorized and human activity in a localized area. As indicated in Alternative B for oil and gas activities above (page 483), motorized human activities have direct and indirect detrimental effects to wildlife and their habitat due to disturbance and displacement from preferred habitats, habitat fragmentation, and loss of individual fitness, productivity, and abundance. Changes to the traditional movement patterns, distribution, and expected normal behavior of wildlife are also anticipated. Scavenging wildlife such as bear, coyote, fox, common raven, and gray jay would be attracted to human developments associated with mining activities if human food and garbage were handled improperly; in the case of bears, this attraction would create safety concerns for mine employees and would likely lead to the destruction of garbage-habituated bears.

Long-term habitat alteration, loss, and fragmentation due to the development of an open pit mine(s) (and the possibility of associated toxic settling pond development) are unavoidable and would potentially have long-term adverse effects on localized wildlife; however, the extent of habitat that would be affected and the possible location(s) of a potential mine are not known and cannot be addressed in detail at this level of planning (RMP) with regard to specific wildlife species. All proposed mining operations, however, would be subject to ROPs, Stips, and site-specific mitigation measures to protect and

conserve localized wildlife resources, including Sensitive Status Species of wildlife.

3. Mineral Materials

This alternative anticipates increased levels of gravel extraction. In general, effects to wildlife would be the same as described above for locatable minerals.

(4) Alternative C

(a) Impacts to Wildlife from Travel Management

1. OHV Management and Trails

Under Alternative C, OHV use would be limited or precluded within specified areas of BLM-managed lands, which would provide for the maintenance of current refugia and for the potential reestablishment of former areas of refugia.

Proposed seasonal limitations on OHV use in specific areas of critical wildlife habitat would provide for the integrity of these habitats during the critical parturition (Nelchina caribou herd, trumpeter swans, Delta bison herd, and moose) and winter (moose) seasons. Potential disturbances to wildlife for motorized uses would be greatly reduced and/or eliminated. Alternative C provides for proactive management of snowmachines in specific areas of concentrated moose use during winter if current or future research indicates there are significant adverse impacts to wintering moose.

Active OHV management along designated trails would minimize habitat degradation and/or loss. The potential for the introduction and proliferation of invasive plant species would be constrained to designated trail corridors and would be more easily managed or eliminated, thereby protecting native vegetation and dependent wildlife populations. Introduction of invasive plant species might occur by other means. This alternative, through proposal of more areas that would limit OHV use to designated trails, would be expected to decrease impacts of OHVs on wildlife more than Alternative A, B, or D would.

2. Roads

Under Alternative C, the potential for new road construction would be less than under any of the other alternatives. In total, no new road construction would be permitted on 3,782,000 acres (54 percent) of BLM-managed lands. New road construction would be permitted on the remaining 46 percent, but would be subject to a case-by-case review and the application of ROPs for the benefit of wildlife and their habitat.

(b) Impacts to Wildlife from Recreation

Alternative C provides the most stringent protective measures for the benefit of wildlife resources through designation of five SRMAs totaling 1,916,000 acres (27 percent of BLM-managed lands in the planning area), by maintenance of or additions to existing ANCSA (d)(1) withdrawals, by limiting OHV use to designated or existing trails, through maintenance of recreational facilities at the current levels, through continued management for existing levels of recreation, and through establishment of recreational visitor use limits in specific areas to ensure human uses are in balance with the needs of the natural resources.

Under this alternative, limited OHV use (including use of snowmachines) within the proposed SRMAs would benefit wildlife resources as described for this alternative above under *Impacts to Wildlife from Travel Management* on page 489.

Within the proposed Tiegel SRMA, helicopter-supported recreational activities would not be allowed north of the Tiegel River or adjacent to Stuart Creek on BLM-managed lands. This restriction would eliminate the potential for disturbance and displacement of wildlife (including Dall sheep, mountain goat, and moose) on winter ranges in these areas by low-level, high decibel aircraft. Research clearly indicates that Dall sheep, mountain goats, and other wildlife are susceptible to disturbance by low-level helicopters, particularly while the animals are on their winter ranges (Cote et al. 1996; Frid 2003; Goldstein et al. forthcoming; Joslin 1986; Krausman et al. 1998).

The northern Tonsina subunit of the Tiegel SRMA would be closed seasonally to motorized vehicles from April 15 through October 15 of each year to eliminate the potential for motorized disturbance and displacement of wildlife. The southern Tonsina subunit would be closed yearlong to motorized vehicles (including snowmachines and helicopter-supported recreation) to allow for the maintenance of existing wildlife refugia in this area.

Within the Delta Range SRMA, designation of motorized trails would afford protection for large acreages of Dall sheep lambing and bison calving areas, and an area of known heavy use by grizzly bears along the Delta River's western floodplain. In addition, portions of the Augustana, Fels, Canwell, McCallum, and Castner glaciers and drainages (all within this proposed SRMA) would be designated yearlong as non-motorized (including prohibitions on snowmachine use), which would afford winter range protection for the local Dall sheep population. The entire Delta Range SRMA would be closed to commercial helicopter-supported recreation activities, which would eliminate the potential for disturbance and displacement of wildlife including Dall sheep and moose on winter ranges in these areas by low-level, high decibel aircraft. This alternative would be more effective at reducing impacts to wildlife from recreation than Alternative A or B, and less effective than Alternative D.

(c) Impacts to Wildlife from Natural and Cultural Resource Protection

Alternative C would designate three ACECs totaling 898,000 acres (13 percent of the BLM-managed land in the planning area) for areas of known high wildlife use and habitat. These three discrete areas include the calving grounds for the Nelchina caribou herd (eastern Talkeetna Mountains), the calving grounds for the Delta bison herd (western floodplain of the Delta River within the Alaska Range), and the Gulkana River wetlands breeding habitat of the trumpeter swan (a Sensitive Status Species). ACEC designation would set aside these discrete areas for the primary purpose of protecting critical wildlife habitat yearlong by 1) maintaining existing ANCSA (d)(1) withdrawals or implementing new withdrawals from minerals activities, and 2) implementing other area-specific objectives such as OHV use limitations, prohibitions on new road or airstrip construction, prohibitions on issuing military permits, and identification of right-of-way avoidance areas.

ACEC designation was specifically proposed for three species (caribou, bison, and trumpeter swan) because their critical habitat areas are discrete and well-documented. However, numerous other wildlife species, including several Sensitive Status Species would benefit from the ACEC designations as these other species and their habitats are located within the same geographic areas.

The designation of approximately one million acres in the Bering Glacier region as an RNA under Alternative C would afford all-encompassing protection from possible threats to not only the flora and fauna of this area, but to the ecologically unique and glacially-influenced environment near the Gulf of Alaska coastline. Through on-going research efforts in the Bering Glacier region, several Sensitive Status wildlife Species have been observed and documented using the area during critical reproductive and molting seasons. These species include, but are not limited to, Canada lynx, harbor seal, tule white-fronted goose, dusky Canada goose, Vancouver Canada goose, red-throated loon, and trumpeter swan. Furthermore, paleontological research has documented a diverse assemblage of invertebrate species, preserved forests, and ancient peats. Preliminary botanical studies have identified more than 350 vascular and nonvascular species. The glacier forelands are also known to support a highly diverse vertebrate community including fresh and anadromous fishes and a previously undocumented harbor seal haul-out. The diversity of fauna and flora in the area around the margins of the Bering Glacier is likely due to the dynamic physical habitat (Payne et al. 2004).

(d) Impacts to Wildlife from Lands and Realty Actions

1. FLPMA Disposals

Disposal of land in the Slana area would have the same effects as described under Alternative A on page 477. Regarding Sensitive Status Species, no habitat degradation or permanent habitat loss would occur associated with the resolution of failed claims or lack of new land disposals.

No positive or negative effects to local wildlife populations or their habitat would result from the disposal of these small and isolated tracts of land along the main highway corridors.

2. Acquisitions

The direction under this alternative to acquire private inholdings as they are made available to the Federal government within the Delta and Gulkana Wild and Scenic River corridors and within the proposed Bering Glacier RNA would curtail further development and conserve wildlife habitat resources. This would include habitat for local populations of Sensitive Status Species migratory birds or Canada lynx.

3. Land Exchanges

Under Alternative C, the potential for land exchanges benefiting both parties would increase the effectiveness of habitat management by enabling resource managers to apply maintenance or enhancement actions on more consolidated or contiguous blocks of land.

4. Land Use Authorizations

Under Alternative C, to protect the integrity of high value wildlife habitat and other natural resource values, no FLPMA or R&PP permits would be issued in specific discrete areas. This would moderately benefit wildlife resources, as there would be less potential for disturbance and displacement of wildlife from preferred habitats.

Increased right-of-way avoidance for specific areas and seasonal restrictions on rights-of-way in other high value wildlife habitat areas would significantly improve the situation for wildlife resources within the Glennallen Field Office. Of particular significance would be the avoidance of overhead powerlines in the area of concentrated trumpeter swan (a Sensitive Status Species) use within the West Fork Gulkana area.

5. Withdrawal Review

Alternative C maintains withdrawals on more acres than does Alternative B or D, and on fewer acres than does Alternative A. Maintenance of withdrawals prevents locatable mineral entry and mineral leasing. The impacts of mineral exploration and development to wildlife under this alternative are discussed under *Impacts to Wildlife from Mineral Exploration and Development* on page 493.

6. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Wildlife from Vegetation Management**1. Fire Management**

Alternative C would not differ significantly from current vegetation management under Alternative A, except that commercial timber harvest would be prohibited within the Delta Bison Calving ACEC, the Nelchina Caribou Calving ACEC, the West Fork ACEC, and the Bering Glacier RNA.

Given the historically demonstrated difficulty in realizing prescribed burn objectives in the Copper River Basin, the proposal to enhance wildlife habitat using only wildland or prescribed fire would severely hamper the efforts of resource managers to positively affect change and reestablish diverse seral stages on a landscape level within the Glennallen Field Office. Barring the occurrence of large scale wildfires in the Copper River Basin, resource managers could expect to see a continued decline in overall habitat quality and productivity under this alternative. Compared to Alternatives C and D, this alternative may provide limited benefits to those species of wildlife that thrive in the presence of diverse and nutritionally productive habitats.

2. Forest Products

Small-scale localized timber removal for personal and commercial use firewood and house logs, and the use of only temporary winter access roads, would significantly limit the adverse effects normally associated with road construction and motorized human activity on wildlife populations and their habitat. The proposed ROPs would ensure that timber removal and prescribed fire management actions would provide for the conservation of valuable habitats or adequately compensate for their degradation.

(f) Impacts to Wildlife from Mineral Exploration and Development**1. Oil and Gas Leasing**

Same as for Alternative A.

2. Locatable Minerals

Alternative C anticipates similar levels of locatable mineral development as described under Alternative A, but the application of ROPs under this alternative would minimize impacts to wildlife from what limited mining activity would occur.

3. Mineral Materials

Alternative C anticipates similar levels of mineral material sales as described under Alternative A, but the application of ROPs under this alternative would minimize impacts to wildlife from what limited gravel extraction would occur.

(5) Alternative D (Proposed RMP)

(a) Impacts to Wildlife from Travel Management

1. OHV Management and Trails

Under Alternative D, no ACEC designations or seasonal restrictions on OHV uses for the benefit of wildlife and their habitat would occur in the known calving areas of the Nelchina caribou herd and the Delta bison herd or within the known breeding wetlands habitat of the trumpeter swan. However, OHVs would be spatially restricted to the use of designated or existing trails on 99 percent of BLM-managed lands, so disturbance or displacement of wildlife by OHVs would be limited and actively managed in these specific areas of critical habitat concern.

Proposed OHV management within SRMAs would extend the areas of protection for wildlife habitat and especially wildlife refugia, provide for active management and control of potential invasive plant species by limiting cross-country travel by OHVs, and greatly reduce the areas of potential disturbance to wildlife and reduce their displacement from preferred habitats year-round.

Active OHV management along designated trails would minimize habitat degradation and loss. The potential for the introduction and proliferation of invasive plant species by OHVs would be constrained to designated and existing trail corridors and would be more easily managed or eliminated, thereby protecting native vegetation and dependent wildlife populations.

Alternative D provides for the potential long-term proactive management of snowmachines in areas of concentrated moose use during winter if current or future research indicates there are significant adverse impacts to wintering moose. Active management of snowmachine use is beneficial to wildlife during the most physically demanding time of year wherever proposed, but especially in areas of known wildlife winter ranges.

Under Alternative D, long-term beneficial effects to terrestrial Sensitive Status Species (Canada lynx and certain migratory birds) and their habitat are expected, as described in this section for other wildlife populations and their habitat, but to a lesser degree than provided for under Alternative C. By limiting OHV use to existing or designated trails and not condoning off-trail cross-country travel, this alternative is more effective at managing impacts to wildlife from OHV use than is Alternative A or B, and less effective than Alternative D.

2. Roads

The construction of new roads would be limited seasonally within critical wildlife parturition areas, which would provide for the necessary protection of sensitive preferred habitat and eliminate the potential for disturbance of wildlife populations during this critical life phase. In total, approximately 6,889,000 acres of BLM-managed lands would be open to new road construction with seasonal restrictions or under the guidelines of the ROPs. A total of 167,000 acres of BLM-managed lands would be closed to all new road construction.

(b) Impacts to Wildlife from Recreation

In general, Alternative D provides for moderate levels of protection for the benefit of the wildlife resource through the designation of SRMAs on currently unencumbered lands (the Delta and Gulkana Wild and Scenic River corridors and the Delta Range area) and on other specific land areas that may be retained in long-term BLM ownership (the Denali Highway corridor and Tielkel area). Outside of these specific areas, no particular management emphasis is placed on recreational activities.

Under Alternative D, the existing ANCSA (d)(1) withdrawals specified within the Gulkana Wild and Scenic River corridor would remain in place; however, all other (d)(1) withdrawals within the previously discussed areas would be partially modified to allow for increased potential development of minerals. Incoming proposals for mineral development activity in these areas would be subject to site-specific reviews and mitigation measures for the benefit of the wildlife resource.

OHV use would be limited to designated or existing trails on all lands that are currently under long-term BLM management, or that would be retained under long-term BLM management. Some areas of limited OHV use (including limitations to snowmachines) would benefit wildlife resources as indicated under *Alternative A, Impacts to Wildlife from Travel Management* on page 476. Within the Delta Wild and Scenic River corridor, BLM would recommend that motorized watercraft on Tangle Lakes be limited to small horsepower “kickers,” thereby benefiting local nesting, brood-rearing, and molting waterfowl and shorebirds through the reduction of noise level disturbances and the amount of detrimental wake action behind watercraft and along shorelines.

In general, recreation facilities would be improved or added where current heavy use levels are creating impact problems, such as along the Denali Highway or in the Tielkel area. Developing facilities to handle impacts should minimize some localized impacts to habitat that are occurring, such as loss of vegetation from dispersed campsites or social trails.

Upper use limits for commercial helicopter-supported recreation would be determined for the Tielkel and Delta Range areas. These limits, in combination with the application of the measures described in the ROPs, would reduce or eliminate the detrimental effects of low-level, high decibel aircraft on wildlife on a site-specific

basis. Overall, Alternative D would be more effective than Alternative A, B, or C at managing impacts to wildlife from recreation activities.

(c) Impacts to Wildlife from Natural and Cultural Resource Protection

Although Alternative D does not designate any areas as ACECs, it does afford a multiple-use approach for the protection of known high value wildlife habitat areas for the specific benefit of a particular species. Alternative D's protective measures are not as all-inclusive or as restrictive as those proposed under Alternative C, but they do identify seasonal restrictions built around the core minimum critical seasons of use for caribou, bison, trumpeter swans, Dall sheep, and mountain goat critical habitat areas. This would provide more area-wide protection than under Alternative A.

The proposed ROPs, which would apply to all permitted activities under Alternative D, afford further specific seasonal and spatial limitations for the protection and conservation of critical habitats for the wildlife species listed above, as well as for moose, migratory and resident birds, and Sensitive Status Species. The habitats of other wildlife species including members of the rodent family, large and small furbearers, and amphibians would directly benefit from protective measures proposed for various other resource values (including wildlife species-specific habitat, fisheries, habitat, riparian areas, water quality, wetlands, soils, vegetation, cultural and visual resources, and control of invasive plant species) within BLM-managed lands.

Although there would be no ACEC designations, limitations would be imposed on OHV use in the three discrete critical wildlife habitat areas for the specific benefit of caribou, bison, and trumpeter swans. Outside of these areas on BLM-managed lands, OHVs would be limited to designated or existing trails for the purpose of protecting other natural resource values, all coincidental to the benefit of wildlife habitat in general. Less than 1 percent of BLM-managed lands would be closed to OHV use (44,000 acres).

Again, the habitat concerns of Sensitive Status Species would be addressed given the habitat information available per species and as afforded under the ROPs.

The designation of approximately 827,000 acres of the Bering Glacier region as an RNA with OHV limitations and maintenance of ANCSA (d)(1) withdrawals on the western two-thirds of the area would maintain and enhance the ecological integrity of this unique area. Wildlife habitat and local wildlife populations (including Sensitive Status Species) would benefit from RNA designation. This alternative provides greater protection to wildlife resources in the Bering Glacier area than does Alternative A.

(d) Impacts to Wildlife from Lands and Realty Actions**1. FLPMA Disposals**

Disposals would be used in the Slana area to resolve scattered cases of unauthorized occupancy. Because development of homesites has already occurred, effects of this action on wildlife habitat would be insignificant. Some positive effects could occur if clean-up of abandoned materials or hazardous materials occurs as a result of resolution of unauthorized use.

Other disposals are expected to have no positive or negative effects to localized wildlife populations or their habitat due to the discontinuous nature and small acreages (less than 100 acres total) of land under consideration for disposal under FLPMA.

No positive or negative effects to Sensitive Status Species or their habitat are expected due to the isolated nature of these small tracts of land. This alternative would have more potential impacts to wildlife through FLPMA disposals than Alternative A or C, and fewer than Alternative B.

2. Acquisitions

The direction under this alternative to acquire private inholdings as they are made available to the Federal government within the Delta and Gulkana Wild and Scenic River corridors and within the proposed Bering Glacier RNA would curtail further development and conserve wildlife habitat resources.

Upon Federal government acquisition, any existing structure(s) would either be maintained for public and/or administrative uses or permanently removed, depending upon structure soundness and quality. If the structure(s) is maintained, slight increases in the level of human activity at these sites would be expected each year.

Regarding Sensitive Status Species, no habitat degradation or permanent habitat loss would occur within seasonal habitat for migratory birds or yearlong habitat for Canada lynx. Effects to localized populations of Sensitive Status Species migratory birds or Canada lynx would be insignificant if acquisition of scattered small tracts of land within the Wild and Scenic River corridors and the proposed Bering Glacier RNA occurred.

3. Land Exchanges

The potential for land exchanges benefiting both parties would increase the effectiveness of habitat management by enabling resource managers to apply maintenance or enhancement actions on more consolidated/contiguous blocks of land.

4. Land Use Authorizations

Other FLPMA and R&PP applications for land uses, leases, and issuance of authorized permits would be closely reviewed and potentially allowed if consistent with proposed primary wildlife habitat objectives for known high value wildlife habitat areas (e.g., Nelchina caribou calving area, Delta bison calving area, West Fork Gulkana trumpeter swan breeding habitat) and other special natural resource value areas.

Increased right-of-way avoidance for specific areas and seasonal restrictions on rights-of-way in other high value wildlife habitat areas would reduce potential adverse affects that could occur under Alternatives A and B. Of particular significance would be the avoidance of overhead powerlines in the area of concentrated trumpeter swan (a Sensitive Status Species) use within the West Fork Gulkana area.

5. Withdrawal Review

Although Alternative D opens up large areas of land (5,793,000 acres, or 83 percent of the planning area, pending conveyance or relinquishment on selected lands) within the Glennallen Field Office for potential minerals exploration and development, significant amounts of withdrawn acreage are maintained (1,210,000 acres, or 17 percent of the planning area). Where withdrawals are revoked, all proposed activities would be subject to ROPs, Stips, and site-specific mitigation measures for the conservation of wildlife resources.

6. Transportation and Utility Corridor Withdrawals

Retention of existing withdrawal status for both the inner and outer corridors of the transportation and utility corridor would maintain management of large linear blocks of land (430,000 acres over 112 linear miles) with established and structured types and levels of disturbance.

The maintenance of existing allowable uses for only locatable mineral entry within the outer corridor of the transportation and utility corridor (approximately 173,000 acres) would occur on big game winter habitat, big game calving and lambing habitat, and migratory bird breeding habitat. The transportation and utility inner corridor (approximately 261,000 acres) would remain closed to all mineral entry. This alternative would modify PLO 5150 to allow for conveyance of 83,000 acres to the State. This area is located north of Paxson and includes Gunn Creek, Fish Lake, and an area north and west of the Delta River. Gunn Creek and areas adjacent to the Delta River are areas that are vegetated with dwarf birch and willow and provides excellent moose winter range. Transfer of this land to the State would not alter its quality as moose winter range. It would, however, change the emphasis of management in these areas, from recreation to mineral exploration and development.

The amendment to dispose of scattered, unmanageable tracts of land (<100 acres) created by highway realignment would have negligible effects on localized wildlife populations and/or their habitat.

The maintenance of the existing allowable uses for only locatable mineral entry within the outer corridor of the transportation and utility corridor, subject to site-specific review, and no mineral entry within the inner corridor would protect Sensitive Status Species habitat and localized populations of Canada lynx and certain migratory birds.

(e) Impacts to Wildlife from Vegetation Management

Alternative D would provide for increased levels of flexibility in vegetation management and habitat enhancement actions while still providing for the conservation of wildlife resources using the ROPs and site-specific mitigation measures. In contrast to current management direction and its emphasis on the enhancement of moose habitat only, habitat enhancement opportunities for moose, caribou, bison, and Dall sheep would be actively pursued in close cooperation with ADF&G biologists, thereby having a larger landscape-level net effect for the benefit of multiple wildlife species and their habitat.

1. Fire Management

Same as for Alternative B.

2. Forest Products

Under Alternative D, both the beneficial and adverse effects of the proposed increased salvage harvest of beetle-killed spruce, targeted at approximately 144,000 acres, would be the same as described for Alternative B, but on a more modest level. Anticipated levels of actual harvest would be 40-100 acres/year.

Emphasis would be placed on the use of temporary roads for access to primarily winter harvest areas, thereby significantly reducing the potential adverse impacts associated with road construction and human activity. However, the potential for limited construction of permanent secondary roads would have long-term adverse effects on localized wildlife populations and their habitat as described generally for roads/trails in Alternative A.

The allowance for personal use firewood gathering within the Delta and Gulkana Wild and Scenic River corridors, consistent with current river management plans, would have negligible effects on local or landscape-level wildlife habitat or wildlife populations.

Given the remote nature of the proposed Bering Glacier RNA and the subsequent protection and conservation of its unique natural values, any proposed timber harvest in that area would be subject to intense scrutiny and would have to be compatible with established wildlife resource values.

(f) Impacts to Wildlife from Mineral Exploration and Development

1. Oil and Gas Leasing

Under Alternative D, a potential 3,907,000 acres of BLM-managed lands (55 percent) would be available to leasing for oil and gas activities subject to terms and conditions of the standard lease form and pending conveyance of selected lands to State and Native entities. No BLM lands would be open to oil and gas leasing subject to major constraints, such as No Surface Occupancy. A total of 1,730,000 acres (25 percent) would be open to leasing but subject to minor constraints such as seasonal restrictions for the benefit of wildlife and critical wildlife habitat (including all lands within known trumpeter swan breeding habitat, known moose winter range, caribou and bison calving areas, lands within one-fourth mile of active bald eagle nests, and lands of greater than 25 percent slope for protection of Dall sheep and mountain goat parturition habitat and winter ranges). A total of 1,463,000 acres (21 percent) would be closed to oil and gas leasing for the protection of resource values, including lands within the western two-thirds of the Bering Glacier RNA, both Wild and Scenic River corridors, and the transportation and utility corridor, except where overridden by PLO 6329.

In general, Alternative D represents a 79 percent increase in the amount of lands open to oil and gas leasing relative to the current management situation represented by Alternative A. The expected effects are the same as outlined above for Alternative B for oil and gas leasing on page 483, but at half the level of development.

2. Locatable Minerals

Under Alternative D, 6,032,000 acres (85 percent) of BLM-managed lands would be open to the operation of mining laws, pending potential conveyance of 5.5 million acres of selected Federal lands to State and Native entities. A total of 1,068,000 acres (15 percent) would be closed to the mining of locatable minerals within the Delta and Gulkana Wild and Scenic River corridors, the western two-thirds of the Bering Glacier RNA, the inner corridor of the transportation and utility corridor, and the Slana settlement area.

In general, Alternative D represents a 78 percent increase in the amount of lands open to the operation of mining laws relative to the current management situation represented by Alternative A. The expected effects are the same as outlined above for Alternative B for locatable minerals on page 488.

3. Mineral Materials

Alternative D anticipates a greater level of mineral material sales than does Alternative A or C, but less than does Alternative B. Because of the limited area involved in gravel extraction (generally 5 acres or less) and the application of ROPs to ensure adequate revegetation of affected sites, impacts to wildlife habitat would be minimal.

f) Fish (Including Sensitive Status Fish Species)

(1) *Impacts Common to All Alternatives*

(a) Impacts to Fish from Sedimentation

All alternatives propose some activities, such as mining, oil and gas exploration and development, road construction, and the use of OHV trails and stream crossings, that could contribute to erosion or sedimentation into streams and rivers. Alternative-specific description of impacts will describe to what degree sedimentation may occur.

Erosion can lead to increased turbidity and sedimentation, which in turn can inhibit feeding and spawning success. All members of the biotic community have the potential to be affected. Potential effects of sedimentation on benthic macroinvertebrates – which are prey species for fish – include interference with respiration and interruption of filter feeding insects' capability to secure food. A more important impact to benthic invertebrates would be smothering of physical habitat by heavy sediments. A loss of interstitial space in the substrate would be highly detrimental to burrowing species. A decrease in abundance could be expected in these situations. In arctic environments, where fish depend on summer food sources to grow and, if food is abundant, to reproduce, a reduced prey base may preclude fish from directing energy towards spawning.

Direct threats to fish from sediment include changes to physical habitat, subsequent decreased reproductive success, and loss of rearing habitat. Physical habitat changes from sediments are most often attributed to finer size particles. Developing eggs can be smothered and newly hatched fry can be killed by suspended sediment that prevents emergence from spawning gravels and interferes with respiration. Embedded sediments fill interstitial spaces and essential winter habitat used by juvenile fish. Filling of pools further limits overwintering sites for adult and juvenile fish.

(b) Impacts to Fish from Recreation

Research has shown that the greatest recreational impacts to upland soils and vegetation occur from the initial use, with little additional effect from increased use

(Clark and Gibbons 1991). The main impacts on fish would come from additional trails or roads, which may gather runoff and begin to rut, thereby leading to increased erosion.

Riparian impacts from recreation (such as dispersed campsites along the Gulkana River) include erosion, loss of shade, loss of food and cover, loss of a “buffer” to upland impacts, and decreased bank stability. Recreational-related changes to the aquatic habitat can occur as alterations to channel morphology and increased pollution. Stream morphology changes would probably only occur as a result of OHV use. Although OHV/stream interactions are sometimes only considered applicable at stream crossings, there are times and places where OHVs users utilize streams as trails. This is not authorized under any alternative, so it is doubtful that it occurs except in isolated, unauthorized and undetected cases. If stream crossings are sited properly, their use would minimize impacts to stream morphology.

Increased pollution can occur as more people use the rivers and dump things into the river, either intentionally or unintentionally. As more boaters and OHV users enter and cross streams, the pollutants from petroleum products increase proportionately. Also, as use in general increases, recreational pollutants such as soaps, fuels, and herbicides also increase.

(c) Impacts to Fish from Vegetation Management

1. Fire Management

Impacts to fisheries from fire and fuels management would be the same under all alternatives. Most of the area within the planning region is in a limited fire suppression category, which means that fires would only be suppressed for the protection of human life and structures. In a worst case scenario, there may be some episodic events related to fire suppression that may affect fish and fish habitat. These effects would be from increased erosion and ground-based control, and alterations of water chemistry from aerial applications of fire retardant. Erosion impacts would likely be small in scale and localized, and could be minimized by rapid rehabilitation after the fire is under control. Negative effects from aerial applications of retardant have been documented only a few times, and only in cases where high levels of retardant have been dumped directly into fish bearing streams. With modern retardants and standards for retardant use, it is highly unlikely that there would be any noticeable effects from fire or fire suppression activities on fish or fish habitat under any alternative.

Fire effects that can directly impact fish populations are increased siltation, altered water quality (dissolved oxygen, pH, suspended and dissolved solids, total hardness, turbidity), and water temperature changes. Indirectly any alternation of the nutrient flow that adversely affects aquatic organisms or results in a reduction in emergent insect production would also affect fish populations, at least temporarily.

The extent of surface erosion after a fire would depend on the topography and soil type of the immediate area. Very little surface erosion normally occurs on burned sites in the planning area because of the gentle topographical features; therefore, stream siltation is usually negligible.

(d) Impacts to Fish from Mineral Exploration and Development

1. Locatable Minerals

In general, surface mining activities increase erosion. Surface mining operations may also disrupt subsurface and surface flow patterns. This could potentially affect seeps and springs that may provide thermal refugia in both summer and winter. Bridges, culverts, and low-flow crossings are integral features to road development associated with surface mining. These features can also interfere with migrations to spawning, feeding, and overwintering sites if improperly designed. Current concerns related to surface mining and road placement include diverting or eliminating flow from small tributaries that connect lakes or connect lakes and rivers. Fish species found in the planning area that move between these habitat types are vulnerable to impact. Potential loss of migratory capacity could stress or kill these fish if they are unable to migrate to food-rich habitat in the summer, reach spawning areas, or move into overwintering habitat. Proper placement of these structures is critical in minimizing impacts to fish.

Mining operations also have the potential to increase pollution that may enter streams through runoff. In addition, major channel and habitat changes could occur if surface mining operations are allowed in active stream channels.

(2) *Alternative A*

(a) Impacts to Fish from Travel Management

1. OHV Management and Trails

Under Alternative A, 96 percent of BLM-managed lands would retain designation as open to OHV use, resulting in some continued localized impacts from erosion due mainly to unauthorized stream crossings. Inventoried OHV trails have authorized anadromous stream crossings with a permit from the State Department of Natural Resources. The unauthorized and unmanaged proliferation of trails would increase under this alternative, with a resulting increase in erosion and sediment impacts.

2. Roads

This alternative would see a slight potential for an increase in road construction associated with mineral exploration and development on State and Native

Corporation lands. Under this alternative, road construction would be considered on a case-by-case basis. Existing standard stipulations would apply that minimize the effects of erosion, flow augmentation, and runoff; however, these stipulations are not as effective or protective as the ROPs that would be applied under Alternatives B, C, and D.

(b) Impacts to Fish from Recreation

Under Alternative A, recreation management is custodial. There are no SRMAs that would set recreation objectives or develop visitor use limits. Trails proliferation would continue, with no guidance for proper construction and placement of new trails. Of all the alternatives, Alternative A would have the most negative impacts to fish and fish habitat from recreation activities.

(c) Impacts to Fish from Natural and Cultural Resource Protection

Under Alternative A, there are no ACECs or RNAs. Protective measures for selected values would be implemented on a case-by-case basis. The standard stipulations currently applied do not afford the same protections as do the ROPs that would be applied under Alternatives B, C, and D. Alternative A would therefore have the most negative effects to fish and fish habitat of all the alternatives.

(d) Impacts to Fish from Lands and Realty Actions

1. FLPMA Disposals

Impacts to fisheries from lands and realty actions would be minor under Alternative A. No lands would be targeted for disposal under this alternative.

2. Acquisitions

Alternative A does not identify any areas for acquisition emphasis. Opportunities for acquisitions are considered on a case-by-case basis. Acquisitions, particularly when they occur along riparian areas, can have a positive impact on fish habitat by preventing development of private land and by providing consistent habitat management.

3. Land Use Authorizations

Under this alternative, specific lands use authorizations would be reviewed on a case-by-case basis for potential impacts. Alternative A anticipates more land use authorizations than does Alternative C, but fewer than does Alternative B or D.

4. **Withdrawal Review**

Under Alternative A, no withdrawal review would take place and all ANCSA (d)(1) withdrawals would remain in place. These withdrawals affect fish habitat by preventing mineral leasing and, in most cases, locatable mineral entry.

5. **Transportation and Utility Corridor Withdrawals**

Alternative A would maintain the existing transportation and utility corridor and all associated withdrawals. These withdrawals would prevent conveyance to the State as well as prevent mineral leasing in the inner and outer corridor and locatable mineral development in the inner corridor.

(e) **Impacts to Fish from Vegetation Management**

1. **Forest Products**

Impacts to fish from forestry operations are expected to be low under Alternative A. Negative impacts associated with logging activities include increased erosion and sedimentation, stream bank destabilization, shade removal, and negative impacts from roads. Standard stipulations are in place under this alternative that would minimize or prevent these impacts. Due to the nature of the terrain and the expense of road building, most forestry operations would be conducted in the winter or would occur close to existing roads, actions that would help minimize any negative effects. Overall, due to the standards stipulations that would apply, the nature of forestry operations in the planning area, and the small scale of likely activities (40 acres per year), there would be negligible effects to fisheries and fish habitat due to forestry operations under this alternative.

(f) **Impacts to Fish from Mineral Exploration and Development**

1. **Oil and Gas Leasing**

No oil and gas leasing would occur under Alternative A.

2. **Locatable Minerals**

Most areas within the planning area are currently closed to locatable mineral entry due to selections or underlying ANCSA (d)(1) withdrawals. However, there are some active operations on BLM-managed lands that would continue as currently stipulated. Of all the alternatives, Alternatives A and C would have the least potential to affect fish and fish habitat due to the small area that would be open for locatable mineral entry under these two alternatives.

3. Mineral Materials

Alternative A anticipates a low level of mineral material sales (less than Alternative B or D, but more than Alternative C). Measures to minimize impacts to fish habitat are considered on a case-by-case basis.

(3) Alternative B

(a) Impacts to Fish from Travel Management

1. OHV Management

Same as for Alternative A.

2. Roads

Alternative B would result in a moderate increase in road construction associated with mineral exploration and development and forestry activities on BLM-managed lands. Under this alternative, road construction would be considered on a case-by-case basis. Application of the ROPs located in Appendix C would minimize the effects of erosion, flow augmentation, and runoff. Overall, the impacts on fish from road construction would be greater under Alternative B than under Alternative C or D, and slightly less than under Alternative A given the stronger ROPs associated with Alternative B.

(b) Impacts to Fish from Recreation

Under Alternative B, recreation management would continue to be custodial in nature, but more facilities would be developed to handle increased recreation use. No SRMAs would be designated to consider existing values or visitor use limits. The proliferation of trails would continue in some areas, with no guidance for proper construction and placement of new trails. Alternative B would provide more protection to fish than would Alternative A as a result of the stronger ROPs that would be applied; however, there would be more impacts than under Alternative C or D.

(c) Impacts to Fish from Natural and Cultural Resource Protection

Under Alternative B, no ACECs or RNAs would be designated. Protective measures for selected values would be implemented on a case-by-case basis. The ROPs would be the only measures to protect fish and fish habitat. These measures should be adequate, however, as all of the ACECs and RNAs proposed in Alternatives C and D are proposed for values other than fisheries. The protection to fish and fish habitat based on the area designations would be only slightly less for Alternative B than for Alternatives D and C.

(d) Impacts to Fish from Lands and Realty Actions**1. FLPMA Disposals**

The lands that are considered for disposal under Alternative D do not provide key fisheries habitat, nor do they have a great influence on the fisheries resources. Also, the utilization of the lands in question would probably change very little regardless of who manages it.

2. Acquisitions

Alternative B proposes no emphasis areas for acquisition. By precluding this option, this alternative would bypass a potentially positive impact on fisheries that could be achieved by the acquisition of private inholdings within the Wild and Scenic River corridors.

3. Land Use Authorizations

Alternative B anticipates the highest level of land use authorizations associated with increased resource development. This alternative adopts the ROPs listed in Appendix C, which identify measures for permitted activities that minimize impacts to fish habitat.

4. Withdrawal Review

Alternative B would revoke all ANCSA (d)(1) withdrawals to allow for increased mineral exploration and development. Effects of mineral development on fish habitat under this alternative are described below under *Impacts to Fish from Mineral Exploration and Development* on page 508.

5. Transportation and Utility Corridor Withdrawals

Alternative B would revoke existing withdrawals and allow for conveyance of the transportation and utility corridor to the State of Alaska. The BLM would lose some important fish habitat, including portions of the Little Tonsina and Tielke Rivers and tributaries to the Gulkana River.

(e) Impacts to Fish from Vegetation Management

This alternative proposes the highest use of fire and forestry to achieve vegetation management goals.

1. Forest Products

This alternative takes the most aggressive approach of all the alternatives to forest management. It anticipates actual harvest of 100-200 acres per year. Negative impacts usually associated with logging activities are increased erosion and sedimentation, stream bank destabilization, shade removal, and negative impacts from roads. Alternative B would implement ROPs that

minimize or prevent these impacts, including requiring buffer strips around streams to protect the vegetative cover, to protect stream banks, and to act as an erosion filter. There are also ROPs associated with road construction that would minimize impacts from road building. Despite the application of ROPs, this alternative has the most potential of any alternative to adversely impact fisheries from forestry operations, mostly due to proposed road construction necessary to access enough country to harvest 360,000 acres.

(f) Impacts to Fish from Mineral Exploration and Development

1. Oil and Gas Leasing

Alternative B anticipates twice the level of exploration and development activity as is predicted in the Reasonably Foreseeable Development Scenario as described above under *Impacts to Recreation from Mineral Exploration and Development, Oil and Gas Leasing* for Alternative B on page 427. The Reasonably Foreseeable Development Scenario itself is described on page 409 under the *Analysis Assumptions and Guidelines* for leasable minerals. Oil and gas operations may affect fisheries resources in several ways, as described below.

a. Effects from Seismic Surveys

Potential threats to overwintering fish from seismic surveys in the planning area would primarily stem from 1) stress associated with acoustic energy pulses transmitted into the ground directly over overwintering pools, and 2) physical damage to overwintering habitat caused by seismic vehicles. Large overwintering pools might allow fish to flee immediate areas of intense stress, whereas fish occupying small pools might not have that option. Depending on proximity, adult fish could suffer no more than temporary discomfort, whereas intense acoustical pulses could be lethal to juveniles. Given that overwintering habitat represents only a small percent of the planning area, it is unlikely that seismic transmissions would occur directly over overwintering sites with any degree of regularity. Furthermore, seismic crews could avoid known overwintering areas. Overall, any effects to overwintering fish caused by winter seismic surveys would be localized and would not be likely to have any effect on fish populations within the planning area.

The potential level of seismic activity would be greater under Alternative B than under any other alternative, but it is expected that any impacts would still be localized.

b. Effects from Water Demand

Overwintering areas are limited to deep-water pools and channels in rivers and streams and to lakes deep enough to provide sufficient under-ice free water during winter. In standing waters, 7 feet is considered the minimum depth for supporting overwintering fish (PAI 2002). Moving waters may deter the thickening of ice, thereby providing overwintering habitat at shallower depths.

Under Alternative B, greater levels of water withdrawal would be expected in conjunction with the increased land available for exploration and development activities as compared to the other alternatives. However, careful adherence to the ROPs and Stips would offer adequate protection to fish. Therefore, winter withdrawal would not be expected to have an effect on fish populations in and adjacent to the planning area.

c. Effects from Exploratory Drilling

Drilling operations require large amounts of water for blending into drilling muds. Operations also produce large amounts of rock cuttings. If an exploratory well were to be plugged and abandoned, drilling muds and cuttings would be re-injected into the bore hole. If the well were to go into production, muds and cuttings would be removed to an approved disposal site. Any chemical leaching into surrounding waters by cuttings temporarily being stored at the drill site could affect nearby fish habitat. ROP-Water-c-6 requires that all permitted operations be conducted in such a manner as to not cause the pollution of any stream or lake.

Even though the disturbance under Alternative B would be two times greater than the amount of disturbance under Alternative D, the prevention of drilling in rivers and streams would provide fish with adequate protection. In general, it is not expected that exploratory drilling would have a measurable effect on fish populations in and adjacent to the planning area under this alternative.

d. Effects from Pad, Road, and Pipeline Construction

Impacts from pad, road, and pipeline constructions are mainly increased erosion and sedimentation, subsurface and surface flow disruption, and increased pollution in runoff. Under Alternatives B, C, and D, the construction of permanent oil and gas facilities, roadways, airstrips, or pipelines would be prohibited within 500 feet of any fish-bearing stream or lake (ROP-F&W-a-6).

Alternative B anticipates twice the level of pad, road, and pipeline construction as does Alternative D. Rigorous adherence to ROPs and existing State environmental regulations would adequately protect fish. For this reason, it is not expected that the construction and placement of drill pads, roadways, pipelines, bridges, or culverts would have a measurable effect on fish populations in and adjacent to the planning area.

e. Effects of Spills

Oil spills can have a range of effects on fish (Malins 1977; Hamilton et al. 1979; Starr et al. 1981). The specific effects depend on the concentration of petroleum present, the length of exposure, and the stage of fish development involved (eggs, larva, and juveniles are most sensitive). If lethal concentrations are encountered (or sub-lethal concentrations over a long enough period), fish mortality is likely to occur. However, mortality caused by a petroleum-related

spill is seldom observed outside the laboratory environment. Most acute-toxicity values (96-hour lethal concentration for 50 percent of test organisms) for fish generally are on the order of 1 to 10 parts per million (ppm). Concentrations measured under the slicks of former oil spills at sea have been less than the acute values for fish and plankton. For example, concentrations of oil 1.6 to 3.3 feet beneath a slick from the Tsesis spill ranged from 50 to 60 parts per billion (Kineman et al. 1980). Extensive sampling following the Exxon Valdez oil spill also found hydrocarbon levels well below those known to be toxic or to cause sub-lethal effects in plankton (Neff 1991). The low concentration of hydrocarbons in the water column following even a large oil spill at sea appears to be the primary reason for the lack of lethal effects on fish and plankton.

The ROPs and Stips associated with Alternatives B, C, and D are designed to prevent or otherwise mitigate oil spills in the planning area. ROP-Water-c-2 specifically prohibits refueling within 500 feet of the active floodplain of fish-bearing waterbodies and within 100 feet from non-fish-bearing waterbodies. Also, all of the requirements under ROP-Haz-c deal specifically with spill prevention and cleanup.

Under Alternative B, the number of spills could increase proportionately with the increase in exploration and development. Using this logic, Alternative B has the potential to have twice as many spills as could Alternative D, and would therefore be twice as likely to have a catastrophic spill. Given the small volume of oil typically involved in leads and spills, as well as the safety requirements for operations in the oil field and stringent clean-up protocols, oil spills associated with Alternative B would not be expected to have a measurable long-term impact on fish populations in or adjacent to the planning area.

2. Locatable Minerals

Dependent on gold prices, Alternative B anticipates a moderate increase in small placer operations on BLM-managed lands. Large operations are possible in this planning period, but would probably occur on State lands, though roads or infrastructure would cross BLM-managed lands. Impacts to fisheries from mining activities are increased erosion, impacts associated with infrastructure (roads), and toxic pollution.

The ROPs common to Alternatives B, C, and D are designed to minimize or prevent impacts from erosion, altered stream flow, stream crossings, and riparian impacts. Strict adherence to the ROPs would minimize any effects to fish and fish habitat within the planning area, but there may be some short-term impacts on water quality and sedimentation based on the location of the actions. These impacts are expected to be short-term and small, and are not expected to have a significant impact to fish or fish habitat in the long-term. It

is likely that Alternative B would have twice the locatable mineral activity as Alternative D, and therefore twice the impact.

3. Mineral Materials

Alternative B anticipates increased gravel extraction. In general, gravel extraction would not likely have a harmful effect on fish spawning grounds as ROP-Water-d-1 prohibits gravel extraction in known fish spawning areas. However, if gravel mining activities were conducted in fish-bearing streams or in tributaries to fish-bearing streams, other detrimental effects could occur. These include the blocking and rerouting of stream channels and increased silt concentrations resulting in reduced primary production, loss of invertebrate prey species, and disruption of feeding patterns for sight dependent feeders (BLM 1989d).

Under Alternatives B, C, and D, ROP-Water-d-2,3 and 4 would minimize the effects of gravel extraction on fish by avoiding gravel mine sites within active channels. The protection provided to fish and fish habitat under Alternative B would be superior to that provided under Alternative A, despite the fact that there would be increased activity under Alternative B.

(4) Alternative C

(a) Impacts to Fish from Travel Management

1. OHV Management and Trails

Travel management under Alternative C would be the most restrictive of all the alternatives, resulting in the fewest potential impacts to fish and fish habitat from unauthorized stream crossings or sedimentation into streams or rivers. In the short-term, there would continue to be some localized impacts from erosion as unmanaged trails continue to proliferate at a slower rate, mostly on State-selected lands. These impacts would be expected to decrease over the planning period as education and enforcement efforts are implemented.

2. Roads

Under Alternative C, the potential for new road construction would be less than under any of the other alternatives. In addition, application of ROPs would minimize the effects of erosion, flow augmentation, and runoff from authorized roads.

(b) Impacts to Fish from Recreation

The designation of 1,916,000 acres as SRMAs under Alternative C would attempt to maintain the existing character in these areas, including use levels and types of use. Proposed OHV management would focus on halting the unmanaged proliferation of

trails. In general, as OHV use becomes more restrictive, the impact or potential for impact to fisheries habitat decreases. Recreation management under Alternative C would have a positive benefit for fisheries habitat within the planning area, mainly due to the management of increased use in specific areas as determined by visitor use limits that would result in limiting the effects of increased use.

Commercial recreation use can have a direct effect on fish populations in that fishers who use guides are generally more successful than fishers who do not. Therefore, as more guides are authorized, there would be more fish harvested and proportionately more incidental mortality related to handling and stress. These effects would mainly occur on the Delta and Gulkana Rivers, and possibly on some of the lakes. Of all the alternatives, this is least likely to happen under Alternatives C and D due to the proposal to determine commercial use limits for commercial uses. However, under all alternatives, any negative changes in the health of the fish populations would likely evoke a response in management regulations by ADF&G.

(c) Impacts to Fish from Natural and Cultural Resource Protection

Under Alternative C, three ACECs totaling 898,000 acres (Delta Bison Calving, Nelchina Caribou Calving, and West Fork), and one RNA totaling 939,000 acres (Bering Glacier) would be designated. Although these ACECs and RNA were proposed for values other than fisheries, fish and fish habitat would benefit from the designations. Along with these special designations come restrictions on road building, trail use, and surface disturbing activities, all of which are discussed above under *Impacts Common to All Alternatives* on page 501. The designations would provide another level of prevention for impacts to fish and fish habitat above and beyond the ROPs that would still apply. The protection of fish and fish habitat based on these designations would be greater under Alternative C than under Alternative D, and would be much greater than under Alternative A or B.

(d) Impacts to Fish from Lands and Realty Actions

1. FLPMA Disposals

No disposals would occur, other than resolution of failed claims in Slana. There would be no effect to fish.

2. Acquisitions

Any acquisition of lands within the Wild and Scenic River corridors would have a positive benefit to fisheries in that the riparian areas would be in a more protected status than if in private ownership.

3. Land Use Authorizations

This alternative limits land use authorizations in SRMAs, ACECs, and RNAs to protect specific resource values. Where authorizations occur, they would be

subject to the ROPs, which contain measures to protect fisheries. Overall, Alternative C would be the most beneficial to fish and fish habitat of all the alternatives relative to land use authorizations.

4. Withdrawal Review

Many withdrawals are maintained to provide maximum protection of resources under Alternative C. Impacts to fish from mineral activities are described in the *Impacts to Fish from Mineral Exploration and Development* section on page 513.

5. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Fish from Vegetation Management

1. Forest Products

Alternative C proposes very little commercial logging (proposed levels are lower than current harvest levels). At this level and with the use of temporary winter roads and application of ROPs, impacts to fisheries would be insignificant.

(f) Impacts to Fish from Mineral Exploration and Development

1. Oil and Gas Leasing

Same as for Alternative A.

2. Locatable Minerals

The anticipated level of locatable mineral development under Alternative C is similar to that identified under Alternative A, but the application of ROPs under this alternative would minimize impacts to fish from what limited mining activity would occur.

3. Mineral Materials

The anticipated level of mineral material sales under Alternative C would be similar to that identified under Alternative A, but the application of ROPs under this alternative would minimize impacts to fish from what limited mining activity would occur.

(5) Alternative D (Proposed RMP)

(a) Impacts to Fish from Travel Management

1. OHV Management and Trails

OHV trails have the potential to cause sedimentation in site-specific areas. Under Alternative D, 99 percent of the BLM-managed lands in the planning area would be designated as limited to designated or existing trails, while the remaining 1 percent would be closed to OHV use. There would continue to be some localized impacts from erosion, due mainly to stream crossings. Inventoried OHV trails have authorized anadromous stream crossings with a permit from the State Department of Natural Resources. Under this alternative, OHV trails would be managed with the objective of minimizing the unmanaged proliferation of trails.

2. Roads

Under Alternative D, there would be a few areas that would be off limits to road construction, even for resource development. ROPs would be applied that minimize the effects of erosion, flow augmentation, and runoff. The main difference between Alternative D and the other alternatives are the restrictions on road building in the Delta River SRMA and Gulkana River SRMA. These rivers are the highest value fisheries in the planning area, and the prohibition on road building would add another level of protection to the fish and fish habitat above and beyond the ROPs. Overall, the impacts from road construction are expected to be low under Alternative D for a variety of reasons: application of ROPs that apply to all road building, prohibitions on road building in the Delta and Gulkana Wild and Scenic River corridors, and limitations on road construction minimized at the level needed for resource extraction and rights-of-way.

(b) Impacts to Fish from Recreation

In general, the SRMAs proposed under Alternative D would attempt to maintain the existing character in these areas, including use levels and types of use. Proposed OHV management would focus on halting the proliferation of trails. In general, as OHV use becomes more restrictive, the impact or potential for impact to fisheries habitat would decrease. Recreation management under Alternative D is expected to have a positive benefit for fisheries habitat within the planning area due to the management of increased use as determined by visitor use limits in specific areas that would limit or eliminate increased impacts.

Commercial recreation use can have a direct effect on fish populations in that fishers who use guides are generally more successful than fishers who do not. Therefore, as more guides are authorized, there would be more fish harvested and proportionately more incidental mortality related to handling and stress. These

effects would mainly occur on the Delta and Gulkana Rivers, and possibly on some of the lakes. Of all the alternatives, this is least likely to happen under Alternatives C and D due to the proposal to determine commercial use limits. However, under all alternatives, any negative changes in the health of the fish populations would likely evoke a response in management regulations by ADF&G.

(c) Impacts to Fish from Natural and Cultural Resource Protection

Under Alternative D, 827,000 acres in the Bering Glacier area would be designated as an RNA. Due to the additional protective measures afforded by RNA designation, this designation would benefit fish and fish habitat in the area. Adoption of the ROPs and Stips would also benefit fish and fish habitat.

(d) Impacts to Fish from Lands and Realty Actions

1. FLPMA Disposals

Under Alternative D, the lands that are considered for disposal do not provide key fisheries habitat, and have little influence on the fisheries resources.

2. Acquisition

Any acquisition of lands within the Wild and Scenic River corridors would have a positive benefit to fisheries in that the riparian areas would be in a more protected status than if in private ownership.

3. Land Use Authorizations

Under Alternative D, land use authorizations would be limited in specific areas to protect resource values. Outside of these areas, land use authorizations would be covered by the ROPs, which would minimize impacts to fish and fish habitat from permitted activities.

4. Withdrawal Review

Although Alternative D opens up large areas of land (5,793,000 acres, or 83 percent of the planning area, pending conveyance or relinquishment on selected lands) within the Glennallen Field Office for potential minerals exploration and development, significant amounts of withdrawn acreage are maintained (1,210,000 acres, or 17 percent of the planning area). Where withdrawals are revoked, all proposed activities would be subject to ROPs, Stips, and site-specific mitigation measures for the conservation of fish habitat.

5. Transportation and Utility Corridor Withdrawals

Same as for Alternative A. However, this alternative would modify PLO 5150 to allow conveyance to the State of 83,000 acres north of Paxson. Fish Creek, an anadromous stream that runs out of Fish Lake, has been the focus of

cooperative efforts between the State, BLM, and Copper River Watershed Project, to re-locate an OHV trail to minimize damage to the creek. These efforts would continue regardless of the ownership of this parcel. Gunn Creek, which also runs through this parcel, is an anadromous stream. There is currently an OHV trail that parallels and crosses Gunn Creek a total of 45 times in 10 miles (Gunn 2005). Under BLM management, this parcel would be part of the Delta Range SRMA and trails would be designated. Under State management and subject to Generally Allowed Uses, the damage to Gunn Creek from OHV use could continue, with subsequent damage to fisheries habitat. Other streams that would be included in the 83,000 acres include portions of Rainy and Eureka creeks. These streams support only non-anadromous species. While conveyance to the State would not immediately effect the condition of these streams, management emphasis would change from recreation and subsistence to mineral exploration and development.

(e) Impacts to Fish from Vegetation Management

1. **Forest Products**

Forestry activities would focus on approximately 144,000 acres of beetle-infested white spruce stands, with an anticipated actual harvest of 40-100 acres per year. Impacts from forestry operations are expected to be low or nonexistent under this alternative. Negative impacts usually associated with logging activities are increased erosion and sedimentation, stream bank destabilization, shade removal, and negative impacts from roads. ROPs that minimize or prevent these impacts would be applied. ROP-F&W-a-10 requires buffer strips around streams to protect the vegetative cover, to protect stream banks, and to act as an erosion filter. Due to the nature of the terrain and the expense of road building, most forestry operations would be winter operations or would occur close to existing roads. Overall, due to the ROPs that are in place and the nature of forestry operations in the planning area, there would be negligible effects to fisheries and fish habitat due to forestry operations.

(f) Impacts to Fish from Mineral Exploration and Development

1. **Oil and Gas Leasing**

The effects of oil and gas exploration on fish and fish habitat are described in detail under Alternative B on page 508. Under Alternative D, these effects would occur over approximately one-half the affected area as described in Alternative B. The anticipated level of development under Alternative D would be at the level described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines* for leasable minerals on page 409.

2. Locatable Minerals

Same as for Alternative B.

3. Mineral Materials

Alternative D anticipates a higher level of mineral material sales than does Alternative A or C, but a lower level than does Alternative B. Mineral material extraction under this alternative is prohibited in the Gulkana Wild and Scenic River corridor and in the wild and scenic portions of the Delta Wild and Scenic River corridor and in the Bering Glacier RNA. The Denali Highway is identified as an avoidance area. In addition, mineral material sales would be subject to ROPs, which would minimize any potential impacts to fish habitat through avoidance of important habitat, proper location of mineral activity locations, and adequate rehabilitation of affected sites.

g) Cultural Resources

(1) *Alternative A*

(a) Impacts to Cultural Resources from Travel Management

1. Access

There are no anticipated affects to cultural resources from maintaining access with 17(b) easements. Continued access along some of these routes across Native-owned lands may affect traditional Native trails that may be eligible to the National Register of Historic Places as a place of religious or cultural importance.

2. OHV Management and Trails

There are two types of effects that would result from continued designation of large areas as “open” for OHV use. The short-term effect would be continued, diffuse impacts on archaeological resources crossed by existing and newly-pioneered trails. In the long-term, additional sites would experience impacts from newly-pioneered OHV trails as well as continued erosion from subsequent use of new trails. Maintaining limitations in TLAD and in the Wild and Scenic River corridors would positively affect archaeological sites by limiting OHV impacts and erosion to designated trails where archaeological sites are not present.

3. Roads

Inventory and mitigation relative to Section 106 of the National Historic Preservation Act would be conducted on a case-by-case basis, thus avoiding or mitigating impacts to cultural resources.

(b) Impacts to Cultural Resources from Recreation

Under Alternative A, recreation management is custodial. There are no SRMAs with recreation objectives or visitor use limits. Trails proliferation would continue, with no guidance for proper construction and placement of new trails, and no cultural resource clearance as new trails develop. Of all the alternatives, Alternative A would have the most potential impacts to cultural resources.

(c) Impacts to Cultural Resources from Natural and Cultural Resource Protection

Under Alternative A, no areas would be designated as ACECs or RNAs, designations that would provide area-wide measures for the protection of cultural resources. TLAD, however, would continue to be managed with an emphasis on protection of cultural resources.

(d) Impacts to Cultural Resources from Lands and Realty Actions

1. FLPMA Disposals

Under Alternative A, no lands would be identified for disposal, thus there would be no effect on cultural resources from land disposals.

2. Land Use Authorizations

Land use authorizations may have an effect on cultural resources, but they would be handled on a case-by-case basis to locate cultural resources and to avoid or mitigate any impacts to the cultural resource.

3. Withdrawal Review

There would be no adverse effects on cultural resources from the maintenance of ANCSA (d)(1) withdrawals.

4. Transportation and Utility Corridor Withdrawals

Under Alternative A, all withdrawals within the transportation and utility corridor would be maintained. Permitted activities within the corridor supporting transportation or utilities would continue to require site-specific cultural review.

(e) Impacts to Cultural Resources from Vegetation Management

Forestry practices anywhere in the Glennallen Field Office have the potential to affect a number of historic resources. Habitat improvement and fuels reduction projects using prescribed burning, mechanical treatment, or logging have the potential to negatively affect cultural resources. However, each project would be

reviewed on a case-by-case basis to avoid or mitigate adverse impacts to historic resources. At the current and anticipated level of forest practices and with the application of case-by-case mitigation, impacts to cultural resources would be insignificant.

(f) **Impacts to Cultural Resources from Mineral Exploration and Development**

1. Oil and Gas Leasing

No oil and gas leasing would occur under Alternative A.

2. Locatable Minerals

Because of existing constraints (ANCSA (d)(1) withdrawals), Alternative A would have the least potential effect on cultural resources as a result of locatable mineral activities than all other alternatives. Current withdrawals prevent locatable mineral entry in most areas of the TLAD. There would be no anticipated change in effect from management of current mining activities on BLM-managed lands. Where small scale placer mining currently occurs, mining has the potential to affect cultural resources through excavation or access. These existing mining activities are handled on a case-by-case basis to locate cultural resources and avoid or mitigate any effects.

3. Mineral Materials

Mineral material extraction at current levels has minimal effect on cultural resources. Where gravel extraction occurs, it has the potential to affect cultural resources through excavation of the area. Potential gravel pits are handled on a case-by-case basis to locate cultural resources and avoid or mitigate any effects.

(2) Alternative B

(a) **Impacts to Cultural Resources from Travel Management**

1. Access

Same as for Alternative A.

2. OHV Management and Trails

Same as for Alternative A.

3. Roads

This alternative would result in a moderate increase in road construction associated with mineral exploration and development and forestry activities on BLM-managed lands. Inventories for compliance with Section 106 of the

National Historic Preservation Act would be conducted on a case-by-case basis, with appropriate mitigation to avoid impacts to cultural resources.

(b) Impacts to Cultural Resources from Recreation

Alternative B has the most potential of all the alternatives to negatively affect cultural resources. Generally, impacts to cultural resources and mitigation would increase for all areas except for TLAD (where OHV use is limited to designated trails), as 96 percent of BLM-managed lands in the planning area would remain open to OHV use with no limitations. Recreational use and development would also be expected to increase.

Recreation management within the Delta Wild and Scenic River corridor would increase impacts to cultural resources as well as increase the amount of required cultural compliance work. The construction of a public use cabin system and developed visitor facilities along the river would also have the potential to affect buried and surface archaeological resources.

Recreation management along the Denali Highway and within the Tiekel planning sub-unit would also increase potential effects on cultural resources through the development of a public use cabin system and the development of additional recreational facilities.

(c) Impacts to Cultural Resources from Natural and Cultural Resource Protection

Under Alternative B, no areas would be designated as ACECs or RNAs, designations that would provide area-wide measures for the protection of cultural resources. TLAD, however, would continue to be managed with an emphasis on protection of cultural resources. This alternative would adopt the ROPs listed in Appendix C, which identify measures to provide protection of cultural resources during permitted activities.

(d) Impacts to Cultural Resources from Lands and Realty Actions

1. FLPMA Disposals

Alternative B would have the greatest negative effect on cultural resources of all the alternatives. Disposal of lands to the public would require large scale Section 106 compliance work to review each area to determine if any National Register listed or eligible site may exist on those lands. The removal of those lands from Federal ownership may result in negative effects to such resources resulting from the private construction of structures, roads, or air strips. These areas may also require additional Native consultation with villages that may have properties of religious or cultural importance on those lands.

2. Land Use Authorizations

Land use authorizations may have an effect on cultural resources, but the authorizations would be handled on a case-by-case basis to locate cultural resources and to avoid or mitigate any impacts to the cultural resource.

3. Withdrawal Review

Revocation of all withdrawals under Alternative B would open the lands to additional uses and possible mineral exploration and development.

4. Transportation and Utility Corridor Withdrawals

Alternative B would revoke existing withdrawals and allow for conveyance of the transportation and utility corridor to the State. If conveyed, the BLM would lose 435,000 acres containing documented historic and pre-historic sites. The descriptions of the Tiekel and Gulkana/Delta Regions in Chapter III under Issue 3, Cultural Resources, include information on the cultural resources that would be lost as a result of the conveyance.

(e) Impacts to Cultural Resources from Vegetation Management

Alternative B is the most likely of all alternatives to increase the potential impacts to cultural resources and to increase required Section 106 compliance work. Forestry impacts anywhere in the Glennallen Field Office have the potential to affect a number of historic resources. Habitat improvement and fuels reduction projects using prescribed burning, mechanical treatment, or logging have the potential to negatively affect cultural resources and increase Section 106 compliance work. However, each project would be reviewed on a case-by-case basis to avoid adverse impacts to historic resources.

(f) Impacts to Cultural Resources from Mineral Exploration and Development

Opening the scenic and recreational portions of the river to mining exploration and development would affect cultural resources through access to the area by heavy equipment as well as by excavation, construction and development of mining related facilities

1. Oil and Gas Leasing

Generally, Alternative B has the most potential to negatively affect cultural resources due to the sizeable amount of land available for leasing. Access to areas open to leasing for exploration purposes may impact cultural resources through overland travel by OHVs, as well as through the drilling of wells. Drilling of wildcat wells may impact previously unknown cultural resources. Development of wildcat wells and any additional wells would require the

additional construction of support facilities like roads and camps, which can affect cultural resources through their construction. The additional construction of associated transmission pipelines and compression/gas plants also has the potential to affect cultural resources. Adhering to measures described in the ROPs and Stips would minimize adverse impacts, but some loss of cultural resources would be unavoidable.

2. Locatable Minerals

Alternative B would have the most potential to negatively affect cultural resources as only the Wild and Scenic Rivers would be closed to mineral location. Dependent on gold prices, this alternative anticipates a moderate increase in small placer operations on BLM-managed lands. Large operations are possible in this planning period, but would probably occur on State lands, though roads or infrastructure would cross BLM-managed lands. These operations could affect cultural resources through both exploration and development by eroding or excavating buried archaeological resources, damaging surface resources, or by causing adverse effects to places that have religious or cultural importance to local villages. These activities would result in increases in both potential affects to cultural resources as well as associated Section 106 workloads and Native consultation efforts.

3. Mineral Materials

Gravel pit development under Alternative B would be expected to increase, with affects to cultural resources similar to those described in the previous paragraph under *Locatable Minerals*.

(4) Alternative C

(a) Impacts to Cultural Resources from Travel Management

1. Access

Same as for Alternative A.

2. OHV Management and Trails

Under Alternative C, 96 percent of the BLM-managed lands in the planning area would be designated as limited to OHVs, either to designated or existing trails. Both short- and long-term effects would result from the “limited” OHV designation. In the short-term, there would be concentrated impacts upon archaeological resources crossed by existing trails as more travel is focused through these arterial routes. These effects would require additional archaeological work to fulfill Section 106 responsibilities for managing these resources. Long-term effects, however, would be positive, as fewer additional sites would experience impacts from newly-pioneered OHV trails. This effect

would also result in decreasing Section 106 work related to trails in the long-term.

In the 281,000 acres (4 percent of BLM-managed land) closed to OHV use under Alternative C, there would be no short- or long-term effects to cultural resources. No additional archaeological work would be required.

3. Roads

Alternative C would see very little potential for new road construction. Prohibitions and limitations on road construction within SRMAs, ACECs, and the RNA, as described in Table 3 in Chapter II, would protect cultural resources and reduce the amount of future Section 106 compliance work conducted as part of the road construction process.

(b) Impacts to Cultural Resources from Recreation

Generally, Alternative C has the least potential to negatively affect cultural resources as this alternative's emphasis in recreation is on maintaining existing recreation experiences. The designation of the Delta Range, Delta River, Gulkana River, Denali Highway, and Tielke SRMAs (totaling 1,916,000 acres, or 27 percent of BLM-managed lands) would reduce short- and long-term effects on cultural resources as well as on required archaeological inventory work and mitigation. Designation of 96 percent of the BLM-managed lands as limited to OHVs, and 4 percent of lands as closed to OHVs would reduce both impacts to cultural resources and required archaeological work over the long-term.

(c) Impacts to Cultural Resources from Natural and Cultural Resource Protection

Designation of 898,000 acres of ACECs (13 percent of BLM-managed lands) and 939,000 acres as an RNA (an additional 13 percent of BLM-managed lands) under Alternative C would provide protection to cultural resources in those areas. Adoption of ROPs would provide additional protection for permitted activities outside of ACECs and the RNA.

(d) Impacts to Cultural Resources from Lands and Realty Actions

Alternative C would have a slightly greater potential for impacting cultural resources than would Alternative A, and would have less potential for impacting these resources than either Alternative B or D.

1. FLPMA Disposals

Alternative C proposes that no disposals occur; therefore, there would be no effect on cultural resources.

2. Land Use Authorizations

Alternative C anticipates the least amount of land use authorizations of all the alternatives. Land use authorizations are limited in special designation areas such as ACECs and RNAs to protect the specific resource values identified for those areas. In addition, ROPs would be applied under this alternative to any land use authorization to protect cultural resources.

3. Withdrawal Review

Alternative C would maintain ANCSA (d)(1) withdrawals in the Wild and Scenic River corridors, all areas designated as ACECs and RNAs, and some portions of designated SRMAs. In most cases, these withdrawals prevent mineral leasing or locatable mineral development, thus preventing the effects under Alternative C discussed below under *Impacts to Cultural Resources from Mineral Exploration and Development* on page 524.

4. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

(e) Impacts to Cultural Resources from Vegetation Management

Generally, Alternative C is the least likely of all the alternatives to negatively affect cultural resources and increase required Section 106 compliance work. Forestry practices anywhere in the Glennallen Field Office have the potential to affect a number of historic resources. Habitat improvement projects using prescribed burning or mechanical treatment have the potential to negatively affect cultural resources and increase Section 106 compliance work.

(f) Impacts to Cultural Resources from Mineral Exploration and Development

1. Oil and Gas Leasing

Same as for Alternative A.

2. Locatable Minerals

Same as for Alternative A.

3. Mineral Materials

Same as for Alternative A.

(5) Alternative D (Proposed RMP)

(a) Impacts to Cultural Resources from Travel Management

1. Access

Same as for Alternative A.

2. OHV Management and Trails

Alternative D would designate 99 percent of BLM-managed lands as limited to OHVs, either to designated or existing trails. The remaining 1 percent of lands would be closed to OHVs. Both short- and long-term effects would result from the “limited” OHV designation. In the short-term, there would be concentrated impacts upon archaeological resources crossed by existing trails as more travel is focused through these arterial routes. These effects would require additional archaeological work to fulfill Section 106 responsibilities for managing these resources. Long-term effects, however, would be positive, as fewer additional sites would experience impacts from newly-pioneered OHV trails. This effect would also result in decreasing Section 106 work related to trails in the long-term.

In the 44,000 acres (less than 1 percent of BLM-managed land) closed to OHV use under Alternative D, there would be no short- or long-term effects to cultural resources. No additional archaeological work would be required.

3. Roads

There would be a slight increase in road construction from the current situation under Alternative D. Prohibitions and limitations on road construction in selected areas (as described in Table 3 in Chapter II) would protect cultural resources and reduce the amount of future Section 106 compliance work conducted as part of the road construction process. Road construction projects outside of those areas may impact cultural resources and increase required Section 106 work. However, these projects would be mitigated on a case-by-case basis, thus avoiding impacts to cultural resources.

(b) Impacts to Cultural Resources from Recreation

No effects to cultural resources along the Gulkana River are anticipated under Alternative D.

The use of existing historic cabins as public use cabins would require additional Section 106 compliance work to ensure that each cabin’s historic values would be retained. Each selected cabin would be evaluated and mitigated on a case-by-case basis. There would be no anticipated effects from inventory and monitoring activities

except by access to these areas along pioneered OHV trails that impact buried archaeological sites.

The Denali Highway passes through terrain with the highest densities of cultural resources within the Glennallen Field Office. Prehistoric and historic mining sites are scattered along the glacial remnant landforms all along the highway. The region also contains the Tangle Lakes Archaeological District (TLAD), one of the largest National Register districts in the United States. However, there would be few anticipated effects from the interim management of Native- and State-selected lands along the Denali Highway except for designations limiting OHVs to existing trails outside of the TLAD. The effects to archaeological resources from OHV traffic would increase during the short-term as buried archaeological sites are eroded by continued traffic along existing trails. These effects would also result in increased Section 106 work to locate and mitigate any sites being affected.

Long-term management of the Denali Highway would have similarly few effects on cultural resources. OHV travel limitations to designated trails would result in declining impacts to buried archaeological sites as fewer trails are pioneered and fewer archaeological sites are eroded by traffic. The construction of non-motorized trails has the potential to expose and erode archaeological sites. The development of recreational facilities along the highway would also have the potential to affect cultural resources. However, all of these activities would be handled on a case-by-case basis to locate cultural resources and mitigate any potential effects.

The Tiekel planning sub-region contains a variety of prehistoric archaeological sites and historic gold rush and later mining sites and trails. Additionally, the National Register Valdez Trail property and its branches pass through the region. The interim management of the region would have few short-term effects and would result in a decrease in both impacts as well as required Section 106 work over a longer term. The designation of BLM public lands as an SRMA with designated trails for OHVs would increase short-term impacts to cultural resources along the trails while reducing impacts to additional resources from newly-pioneered trails. The creation of additional loops to trails has the potential to erode additional archaeological sites, but can be handled on a case-by-case basis to locate any cultural resources and to mitigate any potential effects. The construction of recreational facilities and the use of the Egan Cabin as a public use facility all have the potential to affect cultural resources. These facilities would be addressed on a case-by-case basis to mitigate or avoid impacts to cultural resources.

The long-term management and inclusion of previously selected lands as BLM public land in the Tiekel SRMA would further reduce future potential impacts to cultural resources by designating trails on additional lands. Closure of lands in the Tonsina sub-unit to motor vehicle travel would have a positive affect on cultural resources by eliminating OHV erosion to buried archaeological sites. Helicopter-based skiing is unlikely to affect any resources other than erect historic structures.

Cultural resources in the Delta Range SRMA are poorly known; however, it is likely that the Delta River was used as a travel corridor prehistorically. Limitations confining snow-free OHV use to designated trails would reduce potential impacts to any cultural resources alongside bare ground trails. Limitations placed on winter snowmachine use would have no effect on cultural resources since snow cover protects the ground surface from direct impacts and erosion.

(c) Impacts to Cultural Resources from Natural and Cultural Resource Protection

Alternative D would designate the Bering Glacier as an RNA. Measures proposed for the area would protect cultural and paleontological resources from impacts associated with mineral development, road construction, and OHV use. Measures identified for other areas are not targeted at cultural resources but should afford some level of protection for cultural and paleontological resources. Measures adopted as part of the ROPs would minimize impacts from permitted activities on cultural and paleontological resources.

(d) Impacts to Cultural Resources from Lands and Realty Actions

Alternative D would have less potential to negatively affect cultural resources than would Alternative B, but would have more potential to negatively affect these resources than would Alternative A or C.

1. FLPMA Disposals

Under Alternative D, lands within the Slana settlement area would be made available for disposal under two scenarios (as described in Table 7 in Chapter II) that would have similar effects on cultural resources. Parts of the Slana settlement cover the Ahtna Slana village, and land disposals in the area may require additional Section 106 compliance work to locate cultural features as well as to consult with concerned villages about additional land disposals and their affect on local cultural resources.

Additional land disposals may similarly affect cultural resources and would be handled on a case-by-case basis to locate any cultural resources and to mitigate the effects of the disposal on any cultural resources.

2. Land Use Authorizations

Land use authorizations may have an affect on cultural resources, but would be handled on a case-by-case basis to locate cultural resources and to avoid or mitigate any impacts to the cultural resource. Under Alternative D, limitations would be placed on land use authorizations in specific areas to protect resource values, including cultural resources, in those areas.

3. **Withdrawal Review**

Alternative D would maintain ANCSA (d)(1) withdrawals in the western two-thirds of the Bering Glacier RNA and in portions of the Delta Wild and Scenic River corridor. These withdrawals prohibit mineral leasing or locatable mineral entry, thus preventing the effects under Alternative D discussed below under *Impacts to Cultural Resources from Mineral Exploration and Development* on page 528.

4. **Transportation and Utility Corridor Withdrawals**

This alternative would maintain PLO 5150 for most of the transportation and utility corridor in the planning area. However, PLO 5150 would be modified to allow conveyance to the State of 83,000 acres north of Paxson. Conveyance of these areas would not immediately effect any cultural resources present in the area. However, management emphasis in the area would be expected to change from recreation and subsistence to mineral exploration and development under State ownership.

(e) **Impacts to Cultural Resources from Vegetation Management**

Cultural resources throughout the Glennallen Field Office have the potential of being affected by forestry projects, habitat improvement projects, and fuels reduction projects. Forestry projects in the Tiekel and Tonsina Bluffs areas have the potential to affect a number of historic resources, including National Register Eligible portions of the Valdez Trail. Habitat improvement and fuels reduction projects using prescribed burning, mechanical treatment, or logging have the potential to negatively affect cultural resources and increase Section 106 compliance work. Based on the amount of area identified for potential forestry projects, this alternative has less potential to impact cultural resources than does Alternative B, and more potential to impact cultural resources than does Alternative A or C.

(f) **Impacts to Cultural Resources from Mineral Exploration and Development**

1. **Oil and Gas Leasing**

Generally, Alternative D has less potential to negatively affect cultural resources than does Alternative B, but it has greater potential to negatively affect those resources than do Alternatives A and C. Revocation of withdrawals, which would subsequently allow oil and gas leasing, has the potential to affect cultural resources through exploration and development related activities. Access to areas open to leasing for exploration purposes may impact cultural resources through overland travel by OHV as well as by the drilling of wells. Development of the wildcat wells and any additional wells would require the additional construction of logistic support facilities such as roads and camps, which could affect cultural resources through their

construction. The additional construction of associated transmission pipelines and compression/gas plants would also have the potential to affect cultural resources. ROPs, Stips, and stipulations contained in the standard lease would all minimize impacts and ensure pre-construction cultural compliance with the National Historic Preservation Act.

2. Locatable Minerals

Alternative D has less potential to negatively affect cultural resources than does Alternative B, but more potential than do Alternatives A or C. Areas closed to locatable mineral entry would include all portions of the Wild and Scenic River corridors, the Slana settlement area, the interior transportation and utility corridor, and the western one-third of the Bering Glacier RNA. The remaining areas that are open to mineral entry along the Denali Highway corridor, the Alphabet Hills, and within the Tiekel region have high concentrations of cultural resources or have cultural resources that are largely unknown. Large scale mining across many areas in the Glennallen Field Office could affect cultural resources through both exploration and development by eroding or excavating buried archaeological resources, damaging surface resources, or by causing adverse effects to places that have religious or cultural importance to local villages. These activities could result in increases in both potential affects to cultural resources as well as associated Section 106 workloads and Native consultation efforts.

3. Mineral Materials

Alternative D anticipates a higher level of mineral material sales than does Alternative A or C, but a lower level than does Alternative B. This alternative adopts ROPs to protect cultural resources. Site-specific cultural clearance would occur.

h) Paleontological Resources

(1) Impacts Common to All Alternatives

Required Operating Procedures and the standard language for cultural and paleontological resources that is used for stipulations that are common to all alternatives would preserve and protect paleontological resources for present and future generations. Adverse impacts would be mitigated through specimen recovery and analysis by professional paleontologists. Disposal of lands could result in loss of paleontological resources.

The greatest risk of damage or destruction of paleontological resources across all alternatives would result from casual, unauthorized activities (such as OHV use off of designated trails in TLAD and vandalism) and natural processes (natural decay,

deterioration, or erosion). Under all alternatives, unquantifiable indirect impacts would occur.

i) Visual Resources

(1) Impacts Common to All Alternatives

(a) Impacts to Visual Resources from Travel Management

1. OHV Management and Trails

Major impacts from OHV use on visual resources include changes in color, line, and texture from trail construction or as a result of unrestricted overland travel. Continuous overland OHV use leads to destruction of vegetation, which then results in soil exposure, resulting in a contrast between the adjacent greens of natural vegetation and the browns and grays of exposed soil and organic materials. A contrast in line occurs when the irregular characteristic of vegetation is replaced by a more regular line in the form of a developed or constructed trail. Texture characteristics change from the natural coarse or rough textures of diverse vegetation to the smooth uniform texture of a developed trail or mineral soil area.

Most routes or trails would attract the attention of the casual observer if viewed from a higher observation point and if the routes or trails were located within the foreground-midground zone. Trails or routes that are properly designed and viewed from ground level, however, would not generally attract the attention of a casual observer, except from trailhead observation points.

2. Roads

Major impacts from road construction are similar to those identified for OHV use. Impacts include changes in color, line, and texture from the destruction of vegetation, which then results in soil exposure in a predominantly vegetated area. The resulting contrast is between the adjacent greens of natural vegetation and the browns and grays of exposed soil. In addition, a contrast in line occurs when the irregular characteristic of vegetation is replaced by a more regular line in the form of a constructed road. Texture characteristics change from the natural coarse or rough textures of diverse vegetation to the smooth uniform texture of a constructed road. Additionally, fugitive dust is also a visual impact resulting from construction activities and from the use of gravel or natural material roads. However, fugitive dust is a short-term impact that can be temporary in nature and is dependent on the amount of traffic a road receives.

Road construction and use would attract the attention of the casual observer if viewed from a higher observation point and located within the foreground-middleground and background zones. Roads that are properly designed and viewed from ground level, however, would not generally attract the attention of a casual observer, except as the road is being traversed or where roads intersect.

(b) Impacts to Visual Resources from Recreation

Recreation activities such as facilities development would impact visual resources by introducing straight vertical lines and smooth textures into a predominately horizontal, random landscape. Increased use of existing and new facilities would impact visual resources by introducing different colors into a predominately green and brown landscape. Some of the facilities may be reflective or shiny instead of the more subtle colors of vegetation.

Proper design and construction techniques can reduce impacts from recreation facilities and help maintain a more natural appearing landscape. If viewed from a higher viewpoint, facilities and recreation activities in the foreground-middleground zone would attract the attention of a casual observer. Depending on size, facilities in the background zone may also attract the attention of a casual observer. As viewed from ground level, only activities in the foreground-middleground zone would attract the attention of a casual observer.

(c) Impacts to Visual Resources from Lands and Realty Actions

1. Land Ownership Adjustment

Consolidation of land ownership would reduce possible impacts to visual resources in that consolidation would eliminate the possibility of unmanaged development activities on private land.

2. Transportation and Utility Corridor Withdrawals

Most of the impacts from utilities would be from support structures for the utility, including pipelines. Impacts would introduce primarily vertical lines in a horizontal landscape. Color impacts would include changes from the matte greens of natural vegetation to glossy reflective colors of metal structures and other colors of support facilities such as buildings.

(d) Impacts to Visual Resources from Vegetation Management

1. Fire Management

Both wildland and prescribed fire affect the visual resource by changing line, color, and texture of burned areas in contrast to the surrounding unburned areas. Line would change from a more regular, smooth line to an irregular,

jagged line along the adjacent burned and unburned areas within in the foreground-middleground zones. Short-term color impacts would be expected in burned areas until revegetation occurs. Fire can enhance color over time by creating more diversity in the hues and colors associated with a more diverse vegetation composition. Vegetation texture can change from a medium to fine dense texture in natural areas to a coarse, sparse texture in burned areas as a result of fire. Burned areas, if viewed in the foreground-middleground and background zones, would attract the attention of the casual observer.

Fire suppression activities cause impacts to visual resources by introducing changes in color, texture, and line to a natural landscape. Colors change from the various hues of green vegetation to predominately brown soils and organic materials. Texture changes from a natural medium, subtle texture of vegetation to a coarse, rough contract of disrupted soils and organic materials. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and human-constructed fireline could occur. Even with revegetation of the fireline, which decreases the color contrast, a line contrast may be long-term depending on the vegetation composition between the undisturbed natural area and the disturbed fireline. These impacts may attract the attention of the causal observer in both the foreground-middleground and background zones.

2. Forest Products

Timber harvest activities would have impacts similar to those described above for Fire Management in that timber activities can primarily impact line and texture. The removal of trees changes the density of vegetation, a characteristic of texture. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and the harvest area is dependent on the harvest technique used. Clear-cutting would have the greatest impact to visual resources, while select cutting would have the least impact. Depending on size, timber harvest activities may attract the attention of a casual observer in the foreground-middleground zone, background zone, and even the seldom seen zone.

(e) Impacts to Visual Resources from Mineral Exploration and Development

1. Oil and Gas Leasing

Impacts from activities associated with the development of leasable minerals would primarily be connected with the construction of support facilities. Impacts would the same as impacts discussed under *Impacts to Visual Resources from Recreation* on page 531. Mining of some leasable minerals would have additional impacts to color, line, and texture of mined areas, with the removal of vegetative cover and stockpiled materials creating color contrast between the greens of vegetation and the browns of soils. Texture would

change from a natural medium, subtle texture of vegetation to a coarse, rough contract of disrupted soils and organic materials. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and disturbed landscape could occur.

2. Locatable Minerals

The impacts from the extraction of locatable minerals would vary depending on the methods used and size of operation. Pit mining would have the greatest impact to visual resources impacting line, form, color, and texture characteristics of the natural landscape as described in the previous paragraph under *Oil and Gas Leasing*. Though placer mining techniques tend to be smaller in size, they would have the same impacts to visual resources as pit mining techniques. Shaft mining techniques would have the least impact through the development of support structures located above ground.

3. Mineral Materials

The impacts on visual resources from extraction activities for materials sources are the same as those described for pit mining techniques in the previous paragraph for *Locatable Minerals*.

(2) Alternative A

(a) Impacts to Visual Resources from Travel Management

1. OHV Management and Trails

Continued unmanaged proliferation of OHV trails would continue under Alternative A. Both Alternatives A and B would have the most potential for adverse impacts from OHV use on visual resources as both designate 96 percent of BLM-managed lands as open to OHV use, and only 4 percent of lands as limited to designated or existing trails.

2. Roads

Alternative A anticipates a slight increase in road construction in the planning area. Potential impacts to visual resources would be less than under Alternative B, but greater than under Alternative C or D.

(b) Impacts to Visual Resources from Recreation

Alternative A anticipates increased levels of recreation use. Without application of the ROPs that would be applied to Alternatives B, C, and D, and without assignment of Visual Resource Management (VRM) classes, this alternative has more potential to adversely impacts visual resources from recreation facilities and uses than would Alternatives C and D, and less potential than under Alternative B.

(c) Impacts to Visual Resources from Natural and Cultural Resource Protection

Alternative A does not designate any ACECs or RNAs for protection of specific resource values. For permitted activities, measures for protection of visual resources would continue to be considered on a case-by-case basis.

(d) Impacts to Visual Resources from Lands and Realty Actions

1. FLPMA Disposals

Little to no effect on visual resources would occur.

2. Land Use Authorizations

Without adoption of the ROPs that would be applied under Alternatives B, C, and D, and with land use authorizations considered on a case-by-case basis, Alternative A has more potential for impacts to visual resources than Alternative B, C, or D.

3. Withdrawal Review

Under Alternative A, no withdrawal review would occur and ANCSA (d)(1) withdrawals would remain in place. These withdrawals, in most cases, prevent mineral leasing and locatable mineral entry.

(e) Impacts to Visual Resources from Vegetation Management

Alternative A proposes fewer potential acres of timber harvest than do Alternatives B or D. However, without the adoption of the ROPs listed in Appendix C or assignment of VRM classes, the potential impacts to visual resources are greater under this alternative than under Alternative C or D, and less than under Alternative B.

(f) Impacts to Visual Resources from Mineral Exploration and Development

This alternative anticipates very little mineral development; however, without adoption of the ROPs that would be applied under all other alternatives, Alternative A has more potential for impacts to visual resources than does Alternative C, but less potential than do Alternatives B and D.

(3) Alternative B

In general, Alternative A anticipates the greatest amount of resource development and adopts the least-restrictive VRM classes.

(a) Impacts to Visual Resources from Travel Management

1. OHV Management and Trails

Same as for Alternative A.

2. Roads

Alternative B anticipates a moderate increase in road construction. Despite the application of the ROPs listed in Appendix C, this alternative has more potential for impacts to visual resources from road construction than any other alternative because of the amount of anticipated road construction.

(b) Impacts to Visual Resources from Recreation

This alternative proposes construction of the most number of recreation facilities, and therefore has the most potential for impacts of all the alternatives.

(c) Impacts to Visual Resources from Natural and Cultural Resource Protection

Alternative B does not designate any ACECs or RNAs for protection of specific resource values. Consequently, more area would be open for resource development and subsequent impacts to visual resources. This alternative adopts ROPs, which identify measures to minimize impacts to visual resources from permitted activities.

(d) Impacts to Visual Resources from Lands and Realty Actions

1. FLPMA Disposals

Alternative B has the most potential for impacts to visual resources resulting from the Slana disposal and subsequent settlement and development of 5,000-10,000 acres of land.

2. Land Use Authorizations

Alternative B anticipates a high level of land use authorizations associated with increased resource development. Because the ROPs listed in Appendix C would be adopted, this alternative would have less potential impact on visual

resources than would Alternative A, but more potential impact than Alternative C or D.

3. Withdrawal Review

Alternative B revokes all ANCSA (d)(1) withdrawals, allowing increased opportunity for mineral exploration and development.

(e) Impacts to Visual Resources from Vegetation Management

Alternative B proposes an aggressive forestry program that would include the construction of roads to access commercial timber stands, and therefore has more potential for impacts to visual resources than any other alternative.

(f) Impacts to Visual Resources from Mineral Exploration and Development

Alternative B anticipates the highest level of mineral exploration and development. Despite application of the ROPs, this alternative has more potential to impact visual resources than does any other alternative.

(4) Alternative C

In general, this alternative anticipates the lowest level of resource development and adopts VRM classes that would be the most restrictive to development activities.

(a) Impacts to Visual Resources from Travel Management

1. OHV Management and Trails

Alternative C would result in the least amount of unmanaged OHV trail development, as 96 percent of BLM-managed lands would be designated as limited to OHV use, while 4 percent of land would be closed to OHV use. Consequently, this alternative would result in fewer impacts to visual resources than would any other alternative.

2. Roads

Because of proposed constraints, Alternative C would anticipate less road construction and associated impacts to visual resources than would any other alternative.

(b) Impacts to Visual Resources from Recreation

Alternative C would anticipate less recreation facility development and associated impacts to visual resources than would any other alternative. However, this low

level of facility development may be offset by visual impacts (such as bare ground and social trails) from increased recreation use at dispersed sites where no facilities exist.

(c) Impacts to Visual Resources from Natural and Cultural Resource Protection

Alternative C designates three ACECs and one RNA. These designations are targeted at protection of specific resource values, but in general have the effect of constraining resource development. Consequently, there would be fewer impacts on visual resources under this alternative than under the other alternatives.

(d) Impacts to Visual Resources from Lands and Realty Actions

1. FLPMA Disposals

Alternative C proposes little to no land disposal (including the Slana area); therefore, there would be no effect on visual resources.

2. Land Use Authorizations

Because of area-wide constraints, Alternative C anticipates the lowest level of land use authorizations and associated impacts to visual resources.

3. Withdrawal Review

Alternative C maintains more ANCSA (d)(1) withdrawals than does Alternative B or D, but fewer than does Alternative A. In most cases these withdrawals prevent mineral leasing and locatable mineral entry.

(e) Impacts to Visual Resources from Vegetation Management

Alternative C anticipates less forestry and prescribed burning activity and associated impacts to visual resources than does any other alternative.

(f) Impacts to Visual Resources from Mineral Development and Exploration

Because of area-wide constraints, Alternative C anticipates little mineral development and exploration. Combined with the most restrictive VRM classes and the application of ROPs, impacts to visual resources under this alternative would be less under Alternative B or D, but potentially more than under Alternative A.

(5) Alternative D (Proposed RMP)

(a) Impacts to Visual Resources from Travel Management

1. OHV Management and Trails

Alternative D limits cross-country travel, but some unmanaged proliferation of OHV trails is expected to continue, particularly on State-selected lands where OHVs are limited to existing (but not designated) trails. This alternative would be more effective at limiting impacts to visual resources than would Alternative A or B, but would be less effective than Alternative C.

2. Roads

Alternative D anticipates a slight increase in road construction. With application of the ROPs, this alternative would see less impacts to visual resources than would Alternative A or B, but more impacts than would Alternative C.

(b) Impacts to Visual Resources from Recreation

Alternative D proposes construction of strategically-located recreational facilities to reduce existing impacts from dispersed use, including visual impacts. In combination with application of VRM classes and establishment of visitor use limits in specific areas, this alternative would be the most effective of all the alternatives at reducing or mitigating impacts to visual resources.

(c) Impacts to Visual Resources from Natural and Cultural Resource Protection

Alternative D would designate the Bering Glacier RNA and identifies measures to protect specific resource values in that area. This designation would constrain resource development and, consequently, impacts to visual resources would be minimal. Outside of the RNA, ROPs would be adopted that identify measures to minimize impacts to visual resources from permitted activities.

(d) Impacts to Visual Resources from Lands and Realty Actions

1. FLPMA Disposals

Disposals would be used in Slana to resolve unauthorized occupancy. Because disposals would occur where development already exists, negative effects on visual resources would be insignificant. Some positive effects could occur where resolution of unauthorized occupancy results in clean up of abandoned material.

2. Land Use Authorizations

Alternative D anticipates a slight increase in land use authorizations; however, application of the ROPs would result in fewer impacts to visual resources than would Alternatives A and B, but more potential impacts than would Alternative C.

3. Withdrawal Review

Alternative D would maintain ANCSA (d)(1) withdrawals in the western two-thirds of the Bering Glacier RNA and in portions of the Delta Wild and Scenic River corridor. Alternative D maintains fewer withdrawals than does Alternative A or C, but more than Alternative B. In most cases, these withdrawals prevent mineral leasing and locatable mineral entry. This alternative would maintain PLO 5150 for most of the transportation and utility corridor in the planning area. However, PLO 5150 would be modified to allow conveyance to the State of 83,000 acres north of Paxson. Conveyance of this area would not immediately effect visual resources in the area. However, management emphasis in the area would be expected to change from recreation and subsistence to mineral exploration and development under State ownership. Mineral development in the area could have negative impacts on the area's visual resources, some of which are visible from the Delta River or the Richardson highway.

(e) Impacts to Visual Resources from Vegetation Management

Alternative D anticipates more forestry activity than do Alternatives A or C. However, with application of the VRM classes and the ROPs, expected impacts to visual resources would be less than under Alternatives A or B, but more than under Alternative C.

(f) Impacts to Visual Resources from Mineral Exploration and Development

Alternative D anticipates more mineral exploration and development than would Alternatives A or C. However, with the application VRM classes, and the ROPs and Stips listed in Appendix C, the expected impacts to visual resources would be less than under Alternative B, but more than under Alternative A or C.

j) Areas of Critical Environmental Concern

(1) Alternative A

This alternative would not designate any ACECs or RNAs. Impacts to areas and/or resource values identified in other alternatives for ACEC designation would be as follows:

- Delta bison calving area: There would be little to no likelihood of mineral development due to existing withdrawals. Possible seasonal disturbance from construction or maintenance activities associated with the transportation and utility corridor could occur. This alternative allows for road construction in this area with no seasonal constraints. The area would be designated as “open” to OHV use, which would allow for cross-country motorized travel, with resulting associated impacts to bison habitat and calving bison.
- Nelchina caribou calving area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the area is under BLM management. The area’s “open” designation for OHV use would allow for cross-country motorized travel, with resulting associated seasonal impacts to calving caribou.
- West Fork Gulkana area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the area is under BLM management. The area’s “open” designation for OHV use would allow for cross-country motorized travel, with resulting associated impacts to wetlands and seasonal disturbance of nesting trumpeter swans.
- Bering Glacier area: There would be no potential for mineral development due to existing withdrawals. The area’s “open” designation for OHV use would allow for cross-country motorized travel, with resulting associated impacts to wetlands, ecologically unique areas, and cultural and paleontological sites, and possible disturbance of nesting waterfowl.

(2) Alternative B

This alternative would not designate any ACECs or RNAs. Impacts to areas and/or resource values identified in other alternatives for ACEC designation would be as follows:

- Delta bison calving area: There would be a moderate likelihood of locatable mineral exploration and development. All ANCSA (d)(1) withdrawals would be revoked. This alternative allows for road construction and development in this area with no seasonal constraints, which could result in long-term habitat alteration in bison calving areas, and displacement of animals off the area. The area would be designated as “open” to OHV use, which would allow for cross-country motorized travel, with resulting associated impacts to bison habitat and calving bison.
- Nelchina caribou calving area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the

area is under BLM management due to selections. If the area were retained in long-term Federal ownership, it would be opened to mineral leasing and locatable mineral entry. ROPs would apply seasonal constraints on mineral activities, but mineral development with associated roads, powerlines, and activities would result in some habitat loss and possible displacement of the herd out of this area. The area's "open" designation for OHV use would allow for cross-country motorized travel, with resulting associated impacts to calving caribou.

- West Fork Gulkana area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the area is under BLM management due to selections. If the area were retained in long-term Federal ownership, it would be opened to mineral leasing and locatable mineral entry, with an expected interest in mineral leasing. ROPs and Stips would provide seasonal constraints on mineral activities, but mineral development with associated roads, powerlines, and activities would result in some habitat and wetland loss, displacement of some waterfowl (including trumpeter swans) from nesting habitat, and would change the character of this remote wetland-dominated area.
- Bering Glacier area: Revocation of existing withdrawals would allow for mineral exploration and development, which would be limited on the glacier itself, but could occur on the glacier forelands. Mineral development, with associated roads, infrastructure, and activities, would result in some habitat loss for Special Status Species of waterfowl, and disturbance would likely displace some individuals. Access roads for such activities would provide increased access for recreational use and subsistence hunting and fishing, completely altering the primitive experience that currently exists. Research opportunities on unique ecosystems and Special Status Species would be compromised or lost.

(3) *Alternative C*

The following ACECs and RNA would be designated under this alternative, with protective effects as described:

- Delta Bison Calving ACEC: Designation would protect calving bison and their habitat by maintaining withdrawals against mineral development, prohibiting road construction, restricting off-trail OHV use, and limiting permits and leases in the area.
- Nelchina Caribou Calving ACEC: Designation would protect calving caribou and their habitat by maintaining withdrawals against mineral development, prohibiting road construction, restricting off-trail OHV use, and limiting permits and leases in the area.
- West Fork ACEC: Designation would protect wetlands, trumpeter swan habitat, and moose refugia by maintaining withdrawals against mineral development, prohibiting road construction, limiting other rights-of-way, restricting off-trail OHV use, and limiting permits and leases in the area.
- Bering Glacier RNA: Designation would protect unique ecological communities and habitats by maintaining existing withdrawals against mineral development,

restricting off-trail OHV use, prohibiting road construction, and limiting permits and leases in the area.

Alternative C adopts the strongest measures to protect important and relevant values identified within each ACEC and RNA.

(4) Alternative D (Proposed RMP)

Alternative D would not designate any ACECs, but it would identify specific measures within each area to provide protect important and relevant for that area's resource values. The Bering Glacier RNA would be designated, but at an acreage smaller than that recommended under Alternative C. Impacts to areas and resource values identified would be as follows:

- Delta bison calving area: There would be little to no likelihood of mineral development due to existing withdrawals. If exploration or development did occur, it would be subject to seasonal constraints to protect calving bison and their habitat. This alternative allows for road construction in the area, but seasonal constraints would be implemented. OHV use in the area would be limited to designated trails that would be located to minimize disturbance to calving bison. The BLM would work with ADF&G on a Habitat Management Plan for the area to identify habitat improvement potential for bison range.
- Nelchina caribou calving area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the area is under BLM management due to selections. If portions of the area were retained in long-term Federal ownership, mineral exploration and development could occur subject to seasonal constraints to protect calving caribou. Road construction would be allowed, but only for resource development purposes and subject to seasonal constraints to protect calving caribou. OHVs would be limited to existing trails.
- West Fork Gulkana area: This area consists of predominantly State-selected lands. There is little to no likelihood of mineral development while the area is under BLM management due to selections. If portions of the area were retained in long-term Federal ownership, they would be managed as an ACEC. Mineral exploration and development would be permitted, but would be subject to seasonal constraints to protect wetlands and trumpeter swan nesting. The area would be an avoidance area for new road construction, as well as an avoidance area for the placement of overhead powerlines. OHVs would be limited to existing trails.
- Bering Glacier RNA: All BLM-managed lands in this area would be designated as an RNA. Withdrawals would be maintained in the western two-thirds of the area, which would prohibit mineral exploration or development. Because of harsh conditions and extreme topography, development in the eastern one-third of the area would be highly unlikely. OHVs would be limited to designated trails, which would avoid critical waterfowl nesting areas and ecologically-unique plant communities. Gravel extraction would be prohibited, as would new road construction unless it supported research activities in the area. Prohibition of

helicopter-supported recreational activities in the area would ensure minimal disturbance to sheep and goats and the maintenance of primitive recreation opportunities.

Overall, the protective measures identified in Alternative D would not be as strong as the measures in Alternative C, where ACECs would be designated. Alternative D permits resource development in these areas while protecting important and relevant values.

4. Issue 4: Lands and Realty

For a detailed description of the Lands and Realty actions proposals by alternative, see Table 7 in Chapter II beginning on page 124. The specific withdrawals proposed under Alternatives B, C, and D are listed in Table 6 in Chapter II on page 118.

a) Impacts Common to All Alternatives

(1) Impacts to Lands and Realty from Travel Management

(a) Roads

Transportation and facilities management could require that easements be acquired for any BLM roads or other types of facilities to be located on non-Federal lands. Right-of-way reservations could be needed for BLM roads and other types of facilities to be located on public lands.

(2) Impacts to Lands and Realty from Natural and Cultural Resource Protection

(a) Fish and Wildlife

The management of wildlife and fisheries habitat, including Special Status Species, would have several consequences. The need to protect Special Status Species as well as certain other species of fish and wildlife and their habitat would impact land use authorizations, land ownership adjustments (such as land exchanges or disposals), and the acquisition of legal and physical access to public lands. Facilities proposed for construction under various land use authorizations or access easements in areas that could result in adversely affecting wildlife or fisheries habitat may need to be mitigated, constructed in alternate locations, or in some cases, dropped from consideration. Land ownership adjustments such as exchanges or sales proposed in areas where wildlife or fisheries could be adversely affected may need to be restructured or eliminated from consideration. These types of actions (restructuring of actions to mitigate impacts to fish and wildlife) could increase processing costs and time for both the Federal and non-Federal parties.

(b) Cultural Resources

The management of cultural resources could affect several aspects of the lands and realty program, including land use authorizations, land ownership adjustments, and the reservation or acquisition of legal and physical access to public lands. These

lands and realty actions are considered Federal undertakings and must avoid inadvertent damage to Federal and non-Federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these Federal undertakings, and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. Actions taken to avoid impacts could include rerouting a proposed right-of-way or road easement, or restructuring or abandoning a proposed land ownership adjustment such as a land exchange or sale. Such actions (restructuring of actions to mitigate impacts to cultural resources) can increase processing costs and processing time for both the Federal and non-Federal parties.

(c) Paleontological Resources

The impacts from the management of paleontological resources would be very similar to those of cultural resources as described in the previous paragraph. Lands and realty projects occurring in known fossiliferous areas would require that adequate time and resources be allocated to conducting an inventory of these resources. The discovery of scientifically-important paleontological resources could result in the rerouting or redesign of proposed right-of-way and easement facilities. The presence of these resources could also lead to the restructuring or abandoning of land ownership adjustments such as land exchanges or sales. Such actions (restructuring of actions to mitigate for paleontological resources) can increase processing costs and time for both the Federal and non-Federal parties.

(d) Visual Resource Management

Visual resource management would affect land use authorizations such as rights-of-ways, leases, and permits. Facilities would need to meet objectives for the particular VRM class in which a project was proposed, which could entail mitigation, relocation, or elimination of certain facilities resulting in additional time and costs in project development.

(3) *Impacts to Lands and Realty from Vegetation Management*

(a) General Vegetation

The management of vegetation, including Sensitive Status Species, could have several impacts on the lands and realty program. The need to protect Sensitive Status Species and riparian and wetland vegetation would impact land use authorizations, land ownership adjustments, and reservation or acquisition of legal and physical access to public lands. Facilities proposed for construction under various land use authorizations or access easements in areas where these types of vegetation are present may need to be mitigated, constructed in alternate locations, or, in extreme cases, dropped from consideration.

(b) Fire Management

Wildland fire poses a threat to structures and personal property; prescribed fires are planned and risks are mitigated. Sites are prioritized for protection based on the management option designated for the site or surrounding area. A protection response is also dependent on other factors including but not limited to the availability of firefighting resources, the site condition and location, surrounding vegetation and the statewide situation at the time of the threat. Increase in authorizations and land use increase the potential for human-caused fires. Fire management under all alternatives would generally help protect facilities on public lands authorized through the lands and realty program by reducing fuel loads and suppressing larger fires.

(4) Impacts to Lands and Realty from Mineral Exploration and Development

The management of leasable, salable, and locatable minerals under all alternatives would likely result in requests for land use authorizations such as rights-of-way and permits for utilities and access.

Any renewable energy development proposed for public lands could result in requests for land use authorizations such as rights-of-way and permits.

(5) Impacts to Lands and Realty from Hazardous Material

Land use authorizations for uses which would involve disposal or storage of materials which could contaminate the land would not be issued. Lands proposed for acquisition would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of a landownership adjustment proposal, or remediation in the form of cleanup and removal of the contaminants.

b) Alternative A

(1) Impacts to Lands and Realty from Travel Management

(a) Roads

Alternative A would see a slight potential for increase in road construction associated with mineral exploration and development on State and Native Corporation lands. Any new construction would be considered in applications for rights-of-way on a case-by-case basis. The Wild and Scenic River corridors would be avoidance areas for new construction. There would be no effects to the Lands and Realty program under this alternative.

(2) Impacts to Lands and Realty from Recreation

No SRMAs are currently in place and none would be designated in Alternative A. All land use authorizations would be considered on a case-by-case basis. The Wild and Scenic River corridors would be avoidance areas for land use authorizations. This alternative would have no effects on the Lands and Realty program.

(3) Impacts to Lands and Realty from Natural and Cultural Resource Protection

Under Alternative A, no ACECs or RNAs would be designated, and consequently no area-wide constraints on activities such as land use authorizations would be in place. Measures to minimize impacts to natural and cultural resources from permitted activities, including land use authorizations, would be considered on a case-by-case basis.

(4) Impacts to Lands and Realty from the Lands and Realty Program

For lands and realty, and specifically land use authorizations, this alternative would provide the greatest flexibility in locating certain facilities, such as transmission lines, pipelines, and communication sites as there would be no designated right-of-way corridors or use areas, and no right-of-way avoidance or exclusion areas except for the two Wild and Scenic River corridors.

(a) FLPMA Disposals

No disposals would occur in the Slana area other than those required for the resolution of failed claims. This resolution of failed claims would help to resolve a portion of the trespass issues in the area and would not greatly impact the lands and realty program.

(b) Land Exchanges

No land exchanges would occur under Alternative A.

(c) Land Use Authorizations

Land use authorizations under Alternative A would be considered on a case-by-case basis with site-specific environmental review conducted.

(5) *Impacts to Lands and Realty from Vegetation Management*

(a) Forest Products

Management for forest products would potentially result in the need for road access to forested areas in the form of road rights-of-way and road use agreements. Forest product management could also result in a need for the BLM to acquire easements for legal and physical access to public lands. In comparison with the other alternatives, Alternatives A and C would require the least need for access.

c) Alternative B

(1) *Impacts to Lands and Realty from Travel Management*

(a) Roads

Alternative B would potentially result in the need for new road construction associated with increased resource development. This new construction would be considered in applications for rights-of-way on a case-by-case basis.

(2) *Impacts to Lands and Realty from Recreation*

No SRMAs would be designated under Alternative B. Additional recreation facilities would be constructed along the Denali Highway and in the Tiekel area to handle increased visitor use. All land use authorizations would be considered on a case-by-case basis.

(3) *Impacts to Lands and Realty from Natural and Cultural Resource Protection*

Under Alternative B, no ACECs would be designated and no area-wide constraints would be identified that would impact lands and realty actions. Land use authorizations would be considered on a case-by-case basis, but ROPs would be adopted to minimize impacts to natural and cultural resources.

(4) *Impacts to Lands and Realty from the Lands and Realty Program*

(a) FLPMA Disposals

Alternative B would make approximately 10,000 acres in the Slana area available for disposal to the public at large by competitive or modified bidding procedures. While disposing of this land would potentially eliminate a block of unmanageable land, it

would also create a workload for the lands and realty staff to address, among other things, implementation-level planning and facilitating access needs and rights-of-way.

(b) Land Exchanges

Alternative B does not attempt to identify any areas for exchange until State and Native entitlements are met. After conveyances are completed, exchanges would be considered in the Chistochina/Slana, Tiekel, and Gulkana/Delta planning sub-regions. Land exchanges would have positive impacts on the Lands and Realty program by consolidating land status.

(c) Land Use Authorizations

Alternative B anticipates an increase in land use authorizations associated with increased resource development. While this would have an impact on the Lands and Realty program, adoption of ROPs would enable managers to apply measures consistently to address potential impacts to natural and cultural resources.

(d) Transportation and Utility corridor

Alternative B would revoke PLO 5150 and allow conveyance of the transportation and utility corridor to the State of Alaska.

Oversight and monitoring of the Trans-Alaska Pipeline System (TAPS) for compliance with the Federal Grant of Right-of-Way and State Right-of-Way Lease are the responsibilities of BLM and ADNR, who have agreed to cooperate in this effort through a “Joint Pipeline Office” (JPO). The administrative functions of the office are coordinated by the Federal Authorized Officer from the BLM and the State Pipeline Coordinator from the State Department of Natural Resources.

The Federal Government envisioned additional conveyances of pipeline corridor land from federal ownership as evidenced by the process described in the Federal Agreement and Grant Right-of-Way for TAPS. However, the document does not address the situation or the role of Department of the Interior (DOI) in the event that DOI would no longer manage lands along the TAPS. Although not legally tested, DOI has long asserted that its’ authority under the Trans Alaska Pipeline Authorization Act (TAPAA) to oversee TAPS is system-wide and not tied to land ownership. Whether TAPAA authority remains in full force and effect absent DOI land management responsibilities along TAPS would require further legal analysis. BLM responsibilities for TAPS are tied to its’ role as land manager of the TAPS right-of-way. The Grant provides that upon patent or TA of lands to the State, the right-of-way and other federal authorizations are terminated.

However, because both the State and Federal right-of-way agreements contain very similar conditions and stipulations, conveyance of these lands to the State will not result in a reduction of the authorities necessary to protect natural resources, human safety, public/private property or pipeline integrity. In addition, DOI, through TAPAA, will retain the ability to provide TAPS oversight authority.

Conveyance of these lands to the State would not appreciably change the balance of the roles and responsibilities in the Joint Pipeline Office. BLM would continue to administer the remaining 265 miles of federally owned lands within the corridor as well as represent DOI in administration of its' authorities under TAPAA, which are not based on land ownership and apply to the entire 800 mile pipeline system.

The participating Federal and State agencies rely on BLM and ADNR and their authorities outlined in the Federal Grant of Right-of-Way and the State Right-of-Way Lease to support and subsidize the agencies regulatory responsibilities. For example, the Department of Transportation/Office of Pipeline Safety (DOT/OPS), which has responsibility for administration of 49 CFR Part 195, Transportation of Hazardous Liquids, has traditionally relied on Federal and State staff assigned to the JPO to monitor TAPS and its related facilities, alerting DOT to potential problems on the pipeline.

The BLM has an MOU with the TAPS owner companies to provide funding for oversight activities. This is a funding mechanism that is not available to purely federal regulatory agencies resulting in a reliance on the BLM by nearly all the other participating federal agencies. Currently, the only full-time federal staff assigned to the JPO are from BLM. EPA has assigned one individual to the office on a part time basis, although this position does not rely on BLM for funding.

(5) *Impacts to Lands and Realty from Vegetation Management*

(a) Forest Products

Alternative B proposes an aggressive forestry program targeting beetle-kill white spruce that would, in some cases, require road construction and possibly the need to obtain easements to cross lands under other ownerships.

d) Alternative C

(1) *Impacts to Lands and Realty from Travel Management*

(a) Roads

Very little new road construction would be anticipated under Alternative C.

(2) Impacts to Lands and Realty from Recreation

Alternative C designates five SRMAs. Within portions of these SRMAs, issuance of land use authorizations would be constrained to allow for management consistent with recreation objectives. Some of these areas are also identified as avoidance areas for issuance of rights-of-way.

(3) Impacts to Lands and Realty from Natural and Cultural Resource Protection

Under Alternative C, three ACECs and one RNA would be designated (Delta Bison Calving ACEC, Nelchina Caribou Calving ACEC, West Fork ACEC, and Bering Glacier RNA). Land use authorizations and land ownership adjustments such as sales and exchanges would have to be evaluated on a case-by-case basis to determine whether the proposed action adversely affected relevant and important values. Land use permits and R&PP leases would need to be consistent with the protection of the values for which the areas were designated.

Implementation of VRM classes as proposed under this alternative would require design or citing adjustments for certain land use authorizations, resulting in additional time and cost in project development.

(4) Impacts to Lands and Realty from the Lands and Realty Program

(a) FLPMA Disposals

No disposals would occur in the Slana area other than those required for the resolution of failed claims. While having minimal impact on the Lands and Realty program, this lack of disposals in the Slana area would do nothing towards resolving an unmanageable land status situation. The BLM would continue to try and manage small scattered parcels with small private inholdings.

(b) Land Exchanges

No land exchanges would be considered under Alternative D, which would preclude opportunities for possible consolidation of land status and increasing efficiency in land management.

(c) Land Use Authorizations

Alternative C provides the least amount of flexibility in locating certain facilities such as transmission lines, pipelines, and communication sites. This alternative proposes numerous area-wide constraints and exclusion or avoidance areas for these types of activities.

(5) Impacts to Lands and Realty from Vegetation Management

(a) Forest Products

Given the level of forestry activity proposed under Alternative C, there would be little to no impact on the Lands and Realty program.

e) Alternative D (Proposed RMP)

(1) Impacts to Lands and Realty from Travel Management

(a) Roads

Management for travel would potentially result in a slight increase in the need for new road construction as well as driveways to private parcels of land. New construction would be considered in applications for rights-of-way on a case-by-case basis, except where there are restrictions in the following areas: a) Delta bison calving area; b) Nelchina caribou calving area; c) West Fork Gulkana area; and d) Denali Highway area. In addition, there would be no new road construction permitted in the Wild and Scenic portions of the Delta and Gulkana Wild and Scenic River corridors. New road construction would be avoided in areas managed for a primitive recreation experience in the Delta Range and Tiekkel SRMAs.

(2) Impacts to Lands and Realty from Recreation

Alternative D designates four SRMAs and identifies measures to meet recreation objectives within these areas. In some cases, these measures would include exclusion of land use authorizations unless the permitted activity is consistent with recreation objectives. Overall, this alternative applies more constraints on land use authorizations than does Alternative A or B, but fewer constraints than does Alternative C.

(3) Impacts to Lands and Realty from Natural and Cultural Resource Protection

Under Alternative D, the only area that would receive a special designation would be the Bering Glacier, which would be designated as an RNA. Land use authorizations, land ownership adjustments (such as exchanges and sales), and access to public lands within the planning area would have to be evaluated to determine whether the proposed lands and realty action would adversely affect relevant and important values. In other areas where special values are protected (such as calving areas), land use permits and leases and R&PP leases would be evaluated to ensure protection of special values. Occupancy type permits would be authorized only under the criteria listed in Chapter II. Other occupancy permits (non-cabin) would be allowed if they have been identified as being consistent with protection of values.

(4) Impacts to Lands and Realty from the Lands and Realty Program

(a) FLPMA Disposals

Disposals would be used in the Slana settlement area to resolve unauthorized occupancy. Administration of this program would require working with individuals and the community of Slana but could be handled by existing staff.

Other lands and realty actions proposed under this alternative could be handled with existing staffing levels.

(b) Land Exchanges

Same as for Alternative B.

(c) Land Use Authorizations

Alternative D designates four SRMAs and identifies measures to meet recreation objectives within these areas. It also designates the Bering Glacier RNA and identifies measures to protect that area's specific resource values. In some cases, these measures would include exclusion of land use authorizations unless the permitted activity is consistent with recreation or RNA objectives. Overall, this alternative applies more constraints on land use authorizations than does Alternative A or B, but fewer constraints than does Alternative C.

(d) Transportation and Utility corridor

Under this alternative, the transportation and utility corridor would be maintained with the exception of 83,000 acres north of Paxson. PLO 5150 would be modified to allow for this parcel to be conveyed to the State of Alaska. This would have no effect on Lands and Realty.

(5) Impacts to Lands and Realty from Vegetation Management

(a) Forest Products

Management for forest products under Alternative D would potentially result in the need for road access to forested areas in the form of road rights-of-way and road use agreements. Forest products management could also result in the need for the BLM to acquire easements for legal and physical access to public lands. In comparison with the other alternatives, this alternative would require less need for access than would Alternative B, but more need for access than would Alternative A or C.

5. Issue 5: Vegetation Management

This section for *Issue 5: Vegetation Management* describes impacts to the management of vegetation, fire, and forest products within the planning area. For information regarding the impacts to the occurrence and condition of vegetation, see the *Vegetation* section under *Issue 3: Natural and Cultural Resources* beginning on page 464.

For a detailed description of the Vegetation Management proposals by alternative, see Tables 8 and 9 in Chapter II beginning on page 134.

a) Impacts Common to All Alternatives

(1) Fire Management

Fire is a natural and desirable component of vegetation management. Vegetation communities statewide have been impacted or have evolved through fire. A desired result of burning would be to achieve a mix of burn intensities, while avoiding the extremes of minimal or maximum duff removal over most of the burn area.

A low severity burn would generally only top-kill shrubs and deciduous trees capable of root or crown sprouting. These species would quickly put up new growth from their root systems. However, since little duff is consumed by a low severity burn, seed establishment would be poor. Post burn vegetation would be limited to the deciduous shrub and tree species capable of root or crown sprouting that were present before the burn, and their pre-burn distribution would govern subsequent abundance. However, a goal of restoring younger age diversity in a late-successional system would be met.

A higher severity burn would remove larger portions of the duff, creating good conditions for seed establishment. This might result in killing most of the plants capable of root or crown sprouting under less severe burn conditions, a loss that would be offset by the establishment of a wide variety of new plants through natural seeding. Vegetative recovery would be slower from seeding than from root or crown sprouting; however, reproduction resulting from a more severe burn is more likely to produce a vegetative change.

Sub-populations of Sensitive Status Species plants in areas of wild or prescribed fire events would be subject to the same potential beneficial and detrimental effects as described above. Where possible, prior identification of specific sub-populations would allow resource managers to protect and conserve rare plant habitats.

(a) Wildland Fire

Within the planning area, fire management has been conducted by agreements executed on an interagency, landscape-scale basis since the early 1980s. This effort standardized policies and procedures among land managing agencies in Alaska. As a result, four wildland fire suppression management options (Critical, Full, Modified, and Limited) are utilized statewide by all Federal, State, and Native land managers. This cooperative interagency approach would continue under all alternatives. Management options are adjusted as needed on an annual basis using resource and urban-interface objectives.

(2) Forest Products

The practice of forestry is associated with the removal, harvest, and/or replacement of some component of the forest vegetation (including Sensitive Status Species plants) to obtain desired yields or to steer development of the vegetation towards desired goals or conditions such as moose habitat improvement. It follows that the effects of forestry on vegetation would tend to be long-term in nature. In most cases within the planning area, dead and/or mature timber would be harvested. The removal of the upper canopy would set in motion a successional cycle favoring lower-seral species such as willow. In many cases, trampling and killing decadent sprouting vegetation stimulates new growth and invigorating more vegetative mass. This action favors many wildlife species, as forage can increase 20 to 45 fold with the right combination of harvest and scarification.

Harvesting timber may disturb natural conditions in soils and vegetation, which may facilitate the invasion of noxious weeds.

Sub-populations of Sensitive Status plant Species in areas of proposed timber harvest would be subject to the same potential beneficial and detrimental effects as described above. Where possible, prior identification of specific sub-populations would allow resource managers to protect and conserve rare plant habitats.

b) Alternative A**(1) Fire Management****(a) Prescribed Fire**

Alternative A identifies the least amount of area for the utilization of prescribed fire to accomplish habitat improvement and fuels reduction projects. Approximately 5,000 additional acres would be burned in the Alphabet Hills with a primary objective of creating or maintaining lower-seral shrub-dominated plant communities to improve moose habitat.

(2) Forest Products

Forest products would continue to be produced at about the same level as they have for the past 10 years: an average of 250-300 annual cords of commercial saw logs and firewood over approximately 40 acres/year. In addition, there are also approximately 300 cords of dead white spruce harvested through personal use firewood permits annually. This amount of forest management has very little impact on overall forest health in the area, and contributes little to the achievement of desired conditions stated in Chapter II.

Access to forest products would remain limited, and temporary or winter roads would continue to be utilized in timber sales.

c) Alternative B

(1) Fire Management

(a) Prescribed Fire

Alternative B identifies 1.5 million acres to be targeted for habitat improvement through the use of prescribed burning. This alternative and Alternative D would result in the most acres meeting the desired conditions for moose and caribou, as described in Chapter II. Prescribed burning at this scale over the course of the planning period, combined with the effects of wildland fire, would result in the following landscape-scale effects to vegetation:

- In forest cover types, a mosaic of early-seral shrub dominated vegetation communities combined with late-seral spruce-dominated plant communities would be provided.
- Fuel-loading would be reduced, providing a mosaic of different vegetation cover types and fuel loading, thus reducing the possibility of future stand-replacement large wildfires.
- Resprouting in over-mature willow and aspen would be encouraged.

(2) Forest Products

Alternative B proposes the most acres for potential timber harvest and the most road construction to access harvest areas. Consequently, this alternative would have more short-term detrimental and long-term positive impacts on vegetation than would any of the other alternatives.

This alternative takes an aggressive stance at harvesting up to 360,000 acres throughout the planning area, using road construction where necessary to access units. Harvest would focus on salvage of beetle-kill white spruce, with anticipated harvest levels of 100-200 acres/year. Alternative B would result in the most acres meeting the

desired conditions for white spruce commercial stands as described in Chapter II. Transitional lower-seral shrub dominated cover types would provide a secondary benefit through improved habitat for moose. This positive effect would be offset by the negative impacts of road construction.

Local markets for house logs and firewood would be exceeded by this amount of harvest, so markets outside of the planning area would need to be utilized or alternative forest products (such as chipping or biomass) explored.

d) Alternative C

(1) Fire Management

(a) Prescribed Fire

Alternative C does not identify any areas for habitat improvement through the use of prescribed fire, but instead relies entirely on the use of wildland fire to accomplish objectives. Given the lack of large-scale wildland fires in the past 50 years, not much habitat improvement would occur. Overall, this alternative would be the least effective of all the alternatives at meeting desired conditions for moose and caribou habitat as described in Chapter II. In general, existing forest cover types would continue in a generally late-seral condition, with very little shrub-dominated early seral communities.

(2) Forest Products

Given the anticipated low level of forestry activities, the use of temporary winter roads, and the application of ROPs, impacts to vegetation under Alternative C would be insignificant. This alternative would see fewer long-term benefits from forestry management and fewer achievement of desired conditions for commercial forest stands.

This alternative only permits timber harvest to accomplish habitat improvement objectives; it does not permit new road construction to access harvest areas. Given these constraints, very little timber harvest would occur. Local small mills would probably rely on other private, State, or Native lands to obtain timber. This alternative would result in the least number of acres meeting the desired condition for white spruce commercial stands as described in Chapter II. Beetle-kill trees would continue to deteriorate in quality, becoming unusable even for firewood.

e) Alternative D (Proposed RMP)

(1) Fire Management

Alternative D proposes more prescribed fire than Alternative A or C, and the same amount as Alternative B.

(a) Prescribed Fire

Same as for Alternative B.

(2) Forest Products

Alternative D anticipates a slight increase in forestry activities on BLM-managed lands, targeted at 144,000 acres of beetle-kill white spruce. Anticipated harvest level would be 40-100 acres/year. Given the forestry constraints that would be practiced in the area (use of temporary and mainly winter access and application of ROPs), it is anticipated that negative impacts to vegetation from forestry activities would be slight to insignificant, and would be more than offset by positive long-term impacts as beetle-kill stands are replaced over the long-term by shrub-dominated plant communities and healthy stands of white spruce.

This alternative identifies 144,000 acres of beetle-kill white spruce for potential harvest or salvage work. As is currently practiced, temporary roads or winter access would be used to reduce costs and environmental concerns associated with road construction. Alternative D would result in more acres meeting desired condition for white spruce commercial stands, as described in Chapter II, than would Alternatives A or C. Transitional lower-seral shrub-dominated cover types would provide a secondary benefit through improved habitat for moose.

Local market and demand for house logs and firewood would be met by the amount of harvest provided under this alternative. Use of alternative forest products (such as chipping or biomass) would be explored to accomplish objectives if opportunities arose.

6. Issue 6: Leasable and Locatable Minerals

For a detailed description of the Leasable and Locatable Minerals proposals by alternative, see Tables 10 and 11 in Chapter II beginning on page 145.

Table 41. Oil and Gas Leasing by Alternative

Leasing Status	Acres and Percentages by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Closed	4,325,000 ²	61	137,000 ²	2	2,915,000 ²	41	1,463,000 ²	21
Open with NSO	0 ²	0	0 ²	0	2,322,000 ²	33	0 ²	0
Open with seasonal or minor constraints	0 ²	0	1,724,000 ¹	24	0 ²	0	1,730,000 ²	24
Open subject to standard lease strips	2,731,000 ³	39	5,195,000 ⁴	74	1,819,000 ⁵	26	3,863,000 ⁶	55

* Percent of BLM-managed lands (7,056,000 acres) within the planning area.

- ¹ Includes 898,000 acres currently selected
- ² Includes 1,711,000 acres currently selected
- ³ Includes 2,563,000 acres currently selected
- ⁴ Includes 4,700,000 acres currently selected
- ⁵ Includes 1,819,000 acres currently selected
- ⁶ Includes 3,817,000 acres currently selected

Table 42. Locatable Minerals by Alternative

Mineral Entry Status	Acres and Percentages by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Closed	4,907,000 ²	70	137,000 ²	2	3,737,000 ¹	53	1,068,000 ²	15
Open	2,149,000 ²	30	6,919,000 ³	98	3,319,000 ⁴	47	5,988,000 ⁵	85

* Percent of BLM-managed lands (7,056,000 acres) within the planning area.

- ¹ Includes 2,500,000 acres currently selected
- ² Includes 1,903,000 acres currently selected
- ³ Includes 5,500,000 acres currently selected
- ⁴ Includes 3,200,000 acres currently selected
- ⁵ Includes 5,500,000 acres currently selected

a) Alternative A

(1) Oil and Gas Leasing

Currently, 2.7 million acres are open for oil and gas leasing, though most of these lands are encumbered by Native or State selections. However, there are currently no oil and gas leases and no oil and gas leasing would occur under Alternative A. No withdrawal review would occur and all ANCSA (d)(1) withdrawals would remain in place, pending future legislation or unrelated management direction.

Maintaining ANCSA (d)(1) withdrawals and not considering oil and gas leasing would preclude oil and gas exploration and development and render these resources unrecoverable.

(2) Locatable Minerals

Under Alternative A, no withdrawal review would occur and all ANCSA (d)(1) withdrawals would remain in place. PLO 6329, based on an amendment to the 1980 Southcentral Management Framework Plan, modified existing withdrawals in the Denali and Tielke planning sub-regions to allow for locatable mineral entry. However, most of these lands are currently State- or Native-selected. The Glennallen Field Office would continue to administer active claims through Plans of Operations, but the potential for future exploration and development on BLM-managed lands would be limited.

(3) Mineral Materials

Development of mineral material sites would not be constrained under Alternative A, as this alternative would not apply the ROPs listed in Appendix C or any area-wide designations such as ACECs, though site-specific stipulations would apply.

b) Alternative B

(1) Oil and Gas Leasing

Under Alternative B, all existing ANCSA (d)(1) withdrawals would be revoked to allow for increased opportunities for mineral exploration and development, pending Native and State conveyances.

Approximately 5,195,000 acres (74 percent) of the BLM-administered lands within the planning area would be open subject to the terms and conditions of the standard lease form. Approximately 1,724,000 acres (24 percent) of the planning area would be open to leasing subject to minor constraints (e.g., timing limitations). These constraints would limit exploration and development during specific time periods and increase recovery

costs. Approximately 137,000 acres (2 percent) of the planning area would be closed to oil and gas leasing. Closing these acres to leasing would preclude oil and gas exploration and development and render these resources unrecoverable.

(2) *Locatable Minerals*

Revocation of withdrawals under Alternative B would result in increased exploration and development activity, pending State and Native conveyances. Most operations would be small-scale placer mining operations, but potential would exist for larger mining operations on a scale similar to the Pogo mine. Increased placer mining activity would be dependent on prolonged high gold prices (over \$500/oz). Increased activity could be expected associated with mineral deposits north of the Denali Highway and in the Tiekkel and Bering planning sub-regions. Administration of Plans of Operations, compliance, and mine reclamation would be overseen by Glennallen Field Office personnel.

(3) *Mineral Materials*

Alternative B anticipates an increased demand for gravel to support mineral exploration, development, and road construction. Anticipated development would occur at sites adjacent to the Richardson, Glenn, and Denali Highways.

c) Alternatives C

(1) *Oil and Gas Leasing*

Under Alternative C, withdrawals would be maintained or recommended for all three ACECs (Delta Bison Calving, Nelchina Caribou Calving, and West Fork), the one RNA (Bering Glacier), and all five SRMAs (Delta Range, Delta River, Denali Highway, Gulkana River, and Tiekkel). These withdrawals would eliminate areas that possess the most geologic potential for oil and gas resources. These constraints, combined with State and Native selections, mean that very little potential would exist within the planning period for oil and gas leasing.

Approximately 1,819,000 acres (26 percent) of the BLM-administered lands within the planning area would be open subject to the terms and conditions of the standard lease form. Approximately 2,322,000 acres (33 percent) of the planning area would be open to leasing subject to major constraints (No Surface Occupancy). Oil and gas development in this area would possibly require directional drilling to extract hydrocarbon resources. Should areas with major constraints be wider than the technically feasible reach for directional drilling, some hydrocarbon resource may be rendered unrecoverable. Product price fluctuations may require premature abandonment that would dramatically decrease the recoverability of the resource and potentially create an irretrievable incremental loss of resources. Approximately 2,915,000 acres (41 percent) of the planning area would be closed to oil and gas

leasing. Closing these acres to leasing would preclude oil and gas exploration and development and render these resources unrecoverable.

Alternative C identifies 4,141,000 acres as being open for leasing. However, 2,322,000 of those acres would only be open subject to major constraints (No Surface Occupancy). The remaining 1,819,000 acres are currently State- or Native-selected. Given these constraints, it is assumed that little to no oil and gas development would occur under this alternative.

(2) Locatable Minerals

Under Alternative C, less potential exists for mineral exploration and development than under any other alternative due to the maintenance or recommendation of withdrawals for all three ACECs, the one RNA, and all five SRMAs. These restrictions would cover all areas within the viewshed of the Denali Highway, some of the most geologically promising areas in the planning area. Some mining activity would continue to occur on valid existing claims, but new development would be doubtful based on proposed area-wide constraints. The Glennallen Field Office would continue to administer active claims through Plans of Operations, and the ROPs listed in Appendix C would be implemented.

(3) Mineral Materials

Demand for gravel is not expected to increase under Alternative C; most existing demand would be fulfilled through extraction from private, State, or Native gravel pits. Mineral material extraction would be prohibited in the two Wild and Scenic River corridors, along the entire viewshed of the Denali Highway, in all three ACECs, and in the Bering Glacier RNA.

d) Alternative D (Proposed RMP)

(1) Oil and Gas Leasing

Under Alternative D, most existing ANCSA (d)(1) withdrawals would be revoked or modified to allow for increased opportunities for oil and gas exploration and development, pending Native and State conveyances. Withdrawals would be kept in place within the two Wild and Scenic River corridors, portions of the transportation and utility corridor, and the western two-thirds of the Bering Glacier RNA.

Approximately 3,863,000 acres (55 percent) of the BLM-administered lands within the planning area would be open subject to the terms and conditions of the standard lease form. Approximately 1,730,000 acres (24 percent) of the planning area would be open to leasing subject to minor constraints (e.g., timing limitations). These constraints would limit exploration and development during specific time periods and increase recovery costs. Approximately 1,463,000 acres (21 percent) of the planning area would be

closed to oil and gas leasing. Closing these acres to leasing would preclude oil and gas exploration and development and render these resource unrecoverable.

The areas that show moderate potential for oil and gas are currently State- or Native-selected. Realistically, if exploration showed true potential for development, these lands would likely be conveyed to the Native corporations or the State. However, potential does exist for the leasing of BLM-managed lands. Exploration and development would proceed at the level described in the Reasonably Foreseeable Development Scenario under the *Analysis Assumptions and Guidelines* for leasable minerals on page 409. Should Federal leasing take place, the BLM-Alaska State Office would assume lease administration responsibilities and oversight of field operations.

This alternative would modify PLO 5150 to allow conveyance to the State of 83,000 acres within the outer corridor of the transportation and utility corridor. These are acres that are currently closed to mineral leasing under PLO 5150. The likelihood of oil and gas leasing in this area is very low.

(2) Locatable Minerals

Same as for Alternative B. However, this alternative would modify PLO 5150 to allow conveyance to the State of 83,000 acres within the outer corridor of the transportation and utility corridor. Acres within the outer corridor are currently (under PLO 5150) open to mineral location (metaliferous metals), so this action would not represent a change.

(3) Mineral Materials

Alternative D anticipates a slight increase in demand for gravel over the planning period. Anticipated development would occur at sites adjacent to the Richardson, Glenn, and Denali Highways. Existing gravel pits on State, Native, and private lands would be utilized before new development would occur on BLM lands.

7. Issue 7: Subsistence/Social and Economic Conditions

For a detailed description of the Natural and Cultural Resources proposals by alternative, see [Table 12](#) in Chapter II beginning on page 169.

a) Impacts Common to All Alternatives

(1) Subsistence

(a) Vegetation Management

The goal of vegetation management under all alternatives is to maintain the key ecosystem components and vegetative structures within their natural range. This would be accomplished in varying amounts through fire management and other vegetation manipulation practices, including the extraction of resources (timber) where practical. Under all alternatives, the Authorized Officer would retain adequate discretion to sufficiently prevent any impacts to subsistence practices or resources. Vegetation management under all alternatives is not likely to have any adverse effects on subsistence management.

b) Alternative A

(1) Subsistence

(a) Effects of Use, Occupancy, or Disposition on Subsistence Uses or Needs

1. Travel Management and Recreation

Travel management and recreation under Alternative A would result in the continued unmanaged and unplanned proliferation of OHV use. Additional and poorly planned OHV trails would continue to compromise the effectiveness of habitat refugia for fish and wildlife by allowing easier and increased access to those areas.

Furthermore, unlimited access and unrestricted use would cause further habitat degradation that would affect fish, wildlife, and non-game resources. Protective measures would be reactionary as conflicts are identified and as issues are brought forth by the public. These reactive protective measures would tend to mitigate impacts to a certain extent, but there would probably be an overall decline in resource abundance over the short- and long-term. All

users, including subsistence and sport, would continue to have unrestricted access to subsistence areas and resources once they were on public lands.

2. Natural and Cultural Resources

No areas under Alternative A are designated for additional protection of special values. Current management practices are considered sustainable in regards to subsistence resources; therefore, there should be no noticeable adverse effects to subsistence resources.

3. Lands and Realty

a. Withdrawal Review

All existing withdrawals would be maintained under Alternative A, including withdrawals from selection and withdrawals from mineral entry and mineral leasing. Current management is considered adequate and sustainable to meet subsistence needs. For this reason, this alternative would have no effect on the use, occupancy, or disposition of subsistence uses or needs based on management of lands and realty.

b. Transportation and Utility Corridor Withdrawals

Alternative A would maintain existing withdrawals associated with the transportation and utility corridor. The existing withdrawal prevents mineral leasing or locatable entry as well as appropriations under the land laws. This area would be maintained as is (managed by the BLM). This alternative would have no effect on the use, occupancy, or disposition of subsistence uses or needs.

c. FLPMA Disposals

Under Alternative A, only minimal disposals are considered to resolve unauthorized settlement claims in the Slana area. There would be no impacts to subsistence.

4. Leasable and Locatable Minerals

Current management is considered adequate and sustainable to meet subsistence needs. For this reason, Alternative A would have no effect on the use, occupancy, or disposition of subsistence uses or needs based on management of oil and gas and locatable minerals.

(b) Availability of Other Lands for the Purpose Sought to be Achieved

This Resource Management Plan considers all BLM-managed lands located in the planning area, including selected lands. Conveyed lands, however, cannot be considered for management. No other lands within the Glennallen Field Office boundaries are available for meeting the BLM's multiple use mandate.

(c) Other Alternatives That Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The only alternative that would eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes would be an alternative that prohibited any activity that conflicted with subsistence use or subsistence users. However, the BLM operates under a multiple use mandate. This mandate prevents the BLM from managing resources based on single resources, such as subsistence. Alternatives C and D reduce the use, occupancy, or disposition of public lands needed for subsistence purposes.

(2) Social and Economic Conditions

Increasing State and local populations indicate higher pressure on resources and popular tourist destinations such as the Denali Highway. Visitation may also increase pressure on subsistence resources by increasing resource competition. Timber sales have been offered on BLM lands, and would be considered in the future at a rate of approximately 40 acres/year under Alternative A creating between 0 to 5 jobs. No oil and gas leasing is projected for BLM-managed lands in the planning area. Current small placer mining operations would be maintained, but very little new mining development would occur on BLM-managed lands. Tourism would continue to increase and recreation-related commercial permits would increase.

Of these activities, recreation-related activities have the most potential to benefit the area economically. This alternative places no constraints on these activities, and recreation-supported services and incomes would increase proportionately with increased population and visitor use, even though visitor experience may decline somewhat.

(3) Environmental Justice

Comparing the access to Federal land, use, and development under current management with potential activities under any of the alternatives indicates little likelihood of effect focused on minority or low-income populations.

c) Alternative B

(1) *Subsistence*

(a) Effects of Use, Occupancy, or Disposition on Subsistence Uses or Needs

1. Travel Management and Recreation

Travel and recreation impacts under Alternative B would be similar to, but slightly less than, impacts under Alternative A. Recreation management would continue to be reactive, but the more stringent ROPs that would be applied would minimize effects over Alternative A. New road construction would be considered on a case-by-case basis, but again, the more stringent ROPs would minimize effects over Alternative A. Access for subsistence uses would not be affected as restrictions would not apply to Federally-qualified users in pursuit of traditional activities.

2. Natural and Cultural Resources

Under Alternative B, there are no areas designated for additional protection of special values. Current management practices are considered sustainable in regards to subsistence resources. Under Alternatives B, C, and D, the ROPs that apply to all actions are even more protective than the standard stipulations that would be applied under Alternative A. These ROPs should give sufficient protection to the values the special areas were proposed to protect, although not as much protection as would be provided by Alternatives C and D. Therefore, there should be no noticeable adverse effects to subsistence resources based on special values determinations (or lack of) under Alternative B.

3. Lands and Realty

a. Withdrawal Review

Alternative B would revoke all ANCSA (d)(1) withdrawals, allowing for more mineral exploration and development than under any other alternative. The impacts of increased mineral development on subsistence are described for Alternative B below under *Leasable and Locatable Minerals* on page 569.

b. Transportation and Utility Corridor Withdrawals

This alternative would revoke PLO 5150, allowing conveyance of the transportation and utility corridor to the State. Federal subsistence regulations only apply to unencumbered (non-selected) Federal public lands. State conveyance of the transportation and utility corridor would remove up to 453,000 acres from Federal subsistence management jurisdiction, an area that represents 63 percent of the BLM-managed lands subject to the Federal subsistence priority in Unit 13. This will have a significant impact on

subsistence activities for communities having a customary and traditional use determination for Unit 13.

Local rural residents are exceptionally dependent upon their harvests from the Federal lands of the transportation and utility corridor. Federal public lands represent a very small portion of all land in Unit 13 (only 1.7 percent). The Unit as a whole has historically seen a very high level of hunting by non-rural residents of Anchorage, the Mat-Su Valley, and Fairbanks. Since moose and caribou populations have been at below optimum levels in the past decade, the resources cannot support all the desired hunting activity. State management on the non-Federal lands has reduced non-local hunting, while Federal subsistence regulations have provided for longer seasons and more liberal harvest limits to ensure the rural subsistence priority for local, rural residents. The BLM issued over 3,000 permits to Federally-qualified subsistence users in 2004. These permits resulted in significant subsistence harvest levels. For the nine years ending in 2002, Federal subsistence users annually harvested an average of 313 caribou. In the past three years, Federal permit holders took an average of 45 moose annually. The BLM estimates that 80 percent of these harvests occurred within the Federal lands of the transportation and utility corridor.

In addition to the regulatory protections of the Federal subsistence management program, the Federal lands of the corridor have been able to support large harvests because of their accessibility and strategic location along the migration route of the Nelchina caribou herd. The transportation and utility corridor follows the Richardson Highway, and in fact overlaps it for more than 75 miles. This provides substantial access to the Federal hunting areas by means of highway vehicles. Outside the corridor, there are only 5.5 additional highway miles that provide access to the Federal hunting areas. These additional 5.5 miles are on the Denali Highway, which is not maintained in the winter. The remainder of the Federal hunt areas can only be accessed by OHV, airplane, or boat. Opening up the corridor to conveyance to the State would significantly reduce the availability of resources and the access to the remaining areas. Local residents, currently highly dependent upon these lands for their subsistence harvests, would be obliged to compete with the far larger group of State-qualified hunters across Unit 13 under the State's Tier II system. Public testimony received as part of this planning process demonstrated that Tier II permits are difficult for local rural residents to obtain, particularly younger people, even if they are life-long rural residents. Displaced federal subsistence hunters would put additional pressure on other areas still open for the federal hunt (such as the Wild and Scenic River corridors and Wrangell/St. Elias National Park).

c. **FLPMA Disposals**

Disposal of additional lands in the Slana area under Alternative B would result in an influx of people into the area, most of whom would be seasonal residents. This could increase the demand for subsistence resources in that area.

4. Leasable and Locatable Minerals

Alternative B would revoke ANCSA (d)(1) withdrawals and PLO 5150, which would open up 98 percent of the land base to mineral extraction, including oil and gas. Specific impacts to fish and wildlife species and habitats are discussed previously, and will only be summarized here as they pertain to subsistence use patterns.

ROPs would apply to all activities and are designed to minimize or eliminate effects to fish and wildlife and their habitats. These ROPs would do a particularly good job of protecting fish, since they prohibit instream activities except under rare circumstances. Wildlife species, on the other hand, would be impacted due to loss of habitat. Also, the location of activities would determine what impact there is to subsistence. If activities were located within key migration routes, animals may bypass Federal hunting areas for the duration of the activity. If activities were located in winter range, calving grounds, or refugia, there would be a loss due to overall fitness. Also, roads and associated infrastructure may further expose all resources to non-subsistence users. Non-game subsistence resources may also be affected based on placement of activities. Ground disturbing activities would remove land for a resource production status (e.g., berry picking), although it is unlikely that this would be on a large enough scale to be significant.

In summary, impacts affecting fish and wildlife, or fish and wildlife habitat, would also have a negative effect on subsistence. Mineral exploration activities under Alternative B would impact subsistence wildlife species to a greater degree than would any of the other alternatives. These impacts to subsistence resources and access would probably be localized and minimal. In addition, the ROPs contain measures designed to reduce or eliminate significant restrictions to subsistence uses and needs would not occur.

(b) **Availability of Other Lands for the Purpose Sought to be Achieved**

This Resource Management Plan considers all BLM-managed lands located within the Glennallen Field Office boundaries, including selected lands. Conveyed lands, however, cannot be considered for management. No other lands within the Field Office boundaries are available for meeting the BLM's multiple use mandate.

(c) Other Alternatives That Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The only alternative that would eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes would be an alternative that prohibited any activity that conflicted with subsistence use or subsistence users. However, the BLM operates under a multiple use mandate that prevents management of resources based on a single resources, such as subsistence.

Alternatives A, C, and D reduce the use, occupancy, or disposition of public lands needed for subsistence purposes.

(2) Social and Economic Conditions

The interpretation of this alternative's affect on economy is based on these assumptions and interpretations:

- All withdrawal orders would be modified or terminated to allow mining and oil and gas exploration and development on all Federal land (except wild portions of Wild and Scenic Rivers), and conveyance of the transportation and utility corridor to the State. Three to five small placer mines would open on BLM-managed lands, and a large mine would open on State lands north of the Denali Highway. Gas discovery and development would occur within 5-15 years.
- All land in the Slana disposal area would be offered for sale.
- Commercial timber sales would be offered on up to 360,000 acres over the planning period.
- In five years, the land base in the planning area would be at least 75 percent smaller as a result of land conveyance.
- Economic opportunity currently available to local residents through subsistence harvests may be substantially reduced, with the loss of the specific priority through the Federal subsistence management program. While hunting opportunities would continue under State regulations, competition for the resources would be higher, and likely levels of production much lower.

Mining related revenue sharing is theoretically possible only with the Matanuska-Susitna borough, as only they have the power to tax. This would only involve State-selected land within the borough boundary.

PLO 5150, which segregated the transportation and utility corridor from further appropriation, would be revoked. The State of Alaska has top filed this area, which contains 453,515 acres. This is the primary hunting location for local residents qualifying as Federal subsistence hunters. As noted above, these Federal lands support intense and highly productive subsistence hunting by local rural residents.

Revocation of PLO 5150 and the subsequent transfer of land within the transportation and utility corridor would redirect subsistence hunting activities. Subsistence hunters

would become more dependent on the State of Alaska Tier II permits or on opportunities under general hunting regulations.

One indication of the economic significance of Federal subsistence hunting is found in the estimate that the Federal subsistence moose and caribou harvests have a value in excess of \$250,000 per year, calculated at a replacement cost of \$4.00 per pound. About 30 percent of the wild food harvest for the village of Gulkana, for example, consists of caribou and moose (Wolfe 2004). Gulkana is one of the typical Athabaskan Native villages in the planning area where the loss of subsistence resources may be felt.

In summary, the implementation of Alternative B would have the following economic effects:

- Three to five small placer mines would open 5 to 15 years after the revocations, rejections, and conveyances are completed.
- 10-50 placer mining jobs (income of \$150,000 to \$250,000/year) would be created beginning approximately 5 years from the end of this planning process. These jobs may be created on State mining claims or on private land by agreement or lease if State and Native conveyance is complete.
- Oil and gas exploration and development may also occur on what is now state selected land in the Copper River basin from 5 to 15 years after the revocations, rejections, and conveyances are completed. If the land is returned to BLM ownership as a result of rejected selections, a field development EIS will be completed before development to analyze proposed well, and support facilities on Federal land.
- The Alaska Natural Gas development Authority (ANGDA) filed an application with the State of Alaska to construct a gasline to ship North Slope gas from the Glennallen area to a proposed terminus near Wasilla, Alaska. The gasline is assumed necessary for any gas development project in the planning area.
- 10-30 jobs related to exploration for oil and gas would be created beginning approximately 5 years from the end of this planning process. These jobs will be created on State lease or license areas or on private land if State and Native conveyance is complete, which is likely. Additional jobs would include 25 resulting during field development, 6 for the production stage, and 10 for the abandonment and restoration stages (BLM 2003c).
- The State and the Matanuska Susitna Borough may benefit from property tax on gas field capital improvements. The state can collect a 20 mil tax, which is passed in part to the Matanuska Susitna Borough (11.8 Mils.) A pipeline to or through Wasilla or Palmer area may also be taxed at their higher mil rates.
- Glennallen may benefit by providing lodging, meals, and other services as a result of gas exploration, development, or placer mining. Glennallen area restaurants and the Caribou Hotel received income resulting from the recent Forest Oil gas exploration. As many as 25 gas exploration contract employees stayed at the only local hotel in Glennallen, the closest location to the work activity. This is probably near the maximum number of workers the facility can handle.

- 10-20 jobs may be created related to commercial timber harvest and related road construction. The supply of wood products would exceed local demand for house logs and firewood. Commercial timber sales will be offered on up to 360,000 acres during the next fifteen years.
- Recreation and tourism growth would continue at current rates and continue to provide services employment opportunities for Copper River Basin residents.
- All Lands in the Slana disposal area would be offered for sale. This could have a small effect on the local economy, blended with increased residential and recreation construction occurring in the Copper River Basin.

(3) Environmental Justice

Comparing the access to Federal land, use, and development under current management with potential activities under any of the alternatives indicates little likelihood of effects focused upon minority or low income populations. However, revocation of PLO 5150 under Alternative B and subsequent transfer of lands within the transportation and utility corridor would redirect subsistence hunting activities. Subsistence hunters would become more dependent on the State of Alaska Tier II permits. As outlined above in the discussion for this alternative under Transportation and Utility Corridor Withdrawals on page 567, this action would have a highly adverse effect to low-income minority families within the planning area.

d) Alternative C

(1) Subsistence

(a) Effects of Use, Occupancy, or Disposition on Subsistence Uses or Needs

1. Travel Management and Recreation

Travel and recreation impacts under Alternative C would be similar, but slightly less than, recreation impacts under Alternative D. Recreation management would focus on maintaining the quality of existing experiences and providing for a variety of motorized and non-motorized uses. In general, motorized use allows users to get farther faster. The result is that fish and wildlife are disturbed more often. This can be negative in a variety of ways, ranging from direct killing or catching to increased energy expenditure that reduces overall fitness. Recreation management under Alternative C is the most aggressive in halting the unmanaged proliferation of OHV trails and establishing visitor use limits. Although these measures do not apply to users engaged in traditional subsistence activities, they would benefit the subsistence resources by limiting the recreational pursuit of these resources.

2. Natural and Cultural Resources

Under Alternative C, there would be four areas designated for additional protection of special values (three ACECs created for the protection of wildlife species, and one RNA), so it is anticipated that these additional protective measures would benefit subsistence resources based on the special values determinations of Alternative C. Of all the alternatives, Alternative C would have the most positive benefits to subsistence resources due to management of special values.

3. Lands and Realty

a. Withdrawal Review

Under Alternative C, most of the ANCSA (d)(1) withdrawals would be retained as a measure to protect specific resource values in areas designated as ACECs, RNAs, or SRMAs. In most cases, retention of these withdrawals would prevent mineral leasing and locatable mineral entry in these areas. The impacts of mineral development under Alternative C are found under *Leasable and Locatable Minerals* on page 573.

b. Transportation and Utility Corridor Withdrawals

Same as for Alternative A.

c. FLPMA Disposals

No disposals would occur under Alternative C; therefore, there would be no effect on subsistence.

4. Leasable and Locatable Minerals

Alternative C anticipates minimal mineral exploration and development. Exploration and development under this alternative would have fewer impacts on subsistence wildlife species than would the other alternatives. Anticipated impacts to subsistence resources and access would be localized and minimal. In addition, the ROPs contain measures designed to reduce or eliminate significant restrictions to subsistence uses and needs.

(b) Availability of Other Lands for the Purpose Sought to be Achieved

This Resource Management Plan considers all BLM-managed lands located within the Glennallen Field Office boundaries, including selected lands. Conveyed lands, however, cannot be considered for management. No other lands within the Field Office boundaries are available for meeting the BLM's multiple use mandate.

(c) Other Alternatives That Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The only alternative that would eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes would be an alternative that prohibited any activity that conflicted with subsistence use or subsistence users. However, the BLM operates under a multiple use mandate that prevents management of resources based on single resources, such as subsistence.

(2) *Social and Economic Conditions*

In summary, the implementation of Alternative C would have the following economic effects:

- No new jobs would be created from resource development.
- Timber related jobs created would be between 0 and 5, same as Alternative A.
- Recreation and tourism growth would continue at current rates and continue to provide employment opportunities and opportunities for Copper River Basin residents to provide services. Some commercial recreation opportunities may be limited based on establishment of commercial limits in specific areas.

(3) *Environmental Justice*

Actions proposed under Alternative C would have no negative effect on low-income or minority populations within the planning area. While no jobs would be produced by resource development activities, positive impacts would be derived from effects to subsistence uses and needs.

e) **Alternative D (Proposed RMP)**

(1) *Subsistence*

(a) Effects of Use, Occupancy, or Disposition on Subsistence Uses or Needs

1. **Travel and Recreation Management**

Recreation impacts to subsistence under Alternative D would be similar to, but slightly greater than, recreation impacts under Alternative C. Recreation management would focus on maintaining the quality of existing experiences and providing for a variety of motorized and non-motorized uses. In general, motorized use allows users to get farther faster. The result is that fish and wildlife are disturbed more often. This can be negative in a variety of ways, ranging from direct killing or catching to increased energy expenditure that

reduces overall fitness. Recreation management under Alternative D is aggressive in halting the unmanaged proliferation of OHV trails and establishing visitor use limits. Although these measures do not apply to users engaged in traditional subsistence activities, they would benefit the subsistence resources by limiting the recreational pursuit of these resources. In the short-term, there probably would be no difference in impacts from Alternatives C and D. Over the long-term, however, as trails are inventoried and designated, Alternative C would likely have a more beneficial effect on the abundance and distribution of subsistence resources.

2. Natural and Cultural Resources

Under Alternative D, only one RNA is proposed. The resource values of the other special areas proposed as ACECs under Alternative C would be protected with additional guidelines and protective measures. These additional protective measures make the impacts to subsistence for Alternative D very similar to the impacts under Alternative C, and both alternatives would result in fewer impacts than under Alternative A. In reality on the ground, the impacts would probably be indistinguishable between Alternatives C and D.

3. Lands and Realty

a. Withdrawal Review

Under Alternative D, some of the ANCSA (d)(1) withdrawals would be retained (e.g., those in the Bering Glacier RNA and portions of the Delta Wild and Scenic River corridor). These withdrawals would prevent mineral development within these areas. The impacts of mineral development on subsistence under Alternative D are discussed below under *Leasable and Locatable Minerals* on page 576. Overall, this alternative retains fewer ANCSA (d)(1) withdrawals than does Alternative A or C, but more than Alternative B. Lands that are currently open to Federal subsistence hunting would continue to be open.

b. Transportation and Utility Corridor Withdrawals

PLO 5150 would be modified to allow for 83,000 acres to be conveyed to the State. These lands include the Gunn Creek segment which is northeast of Paxson, and approximately 59,000 acres north of Paxson and west of the Delta river (see Map 18, Chapter 2). These areas represent approximately sixteen percent of the BLM-managed lands on which the Federal subsistence priority applies. However, these parcels have less access and less concentrated Federal subsistence hunting effort than other BLM-managed lands. The areas are off the highway and require access by foot, OHV, or snowmachine. Additionally, approximately 50 percent of the northern area, west of the Delta River, is mountainous, glaciated terrain, where no caribou or moose harvest occurs. Based on annual harvest data since 1994, the average annual federal subsistence harvest from these parcels for caribou is less than five percent of the total Federal subsistence harvest in the region. For moose, the average annual federal subsistence harvest from these parcels is approximately 10

percent. This would still leave a viable unit available for rural priority and federal harvest on the remainder of the BLM-managed lands where the Federal subsistence priority is implemented. Thus, this alternative would have little effect on the use, occupancy, or disposition of subsistence uses or needs.

c. **FLPMA Disposals**

Under Alternative D, disposal of lands in the Slana area to resolve unauthorized occupancy would have insignificant effects on demands for subsistence resources in the area.

4. Leasable and Locatable Minerals

Alternative D would revoke most of the ANCSA (d)(1) withdrawals, which would open up 85 percent of the land base to mineral extraction, including oil and gas (pending State or Native conveyance). Specific impacts to fish and wildlife species and habitats are discussed previously, and are only summarized here as they pertain to subsistence use patterns.

ROPs would apply to all permitted activities and are designed to minimize affects to fish and wildlife and their habitats. These ROPs would do a particularly good job of protecting fish, since they prohibit instream activities except under rare circumstances. Wildlife species, on the other hand, would be impacted due to loss of habitat. Also, the location of activities would determine what impact there is to subsistence. If activities were located within key migration routes, animals may bypass Federal hunting areas for the duration of activities. If activities were located in winter range, calving grounds, or refugia, there could be a loss due to overall fitness. Also, roads and associated other infrastructure may allow all resources (including fish, wildlife, and non-game resources) to be much more exploited by non-subsistence users. Non-game subsistence resources may also be affected based on the placement of activities. Ground disturbing activities would remove that land from a resource protection status, although it is unlikely that this would be on a scale large enough to be significant.

In summary, impacts affecting fish and wildlife, or fish and wildlife habitat, would also have a negative effect on subsistence. Mineral exploration activities under Alternative D would have fewer impacts on subsistence wildlife species than under Alternative A, but would have more impacts than under Alternative C. Exact impacts are hard to predict because of the unknown potential for exploration. The likelihood of large scale activity during the life of this plan is generally considered to be small. Therefore, any impacts to subsistence resources and access would probably be localized and minimal. In addition, the ROPs contain measures designed to reduce or eliminate significant restrictions to subsistence uses and needs.

(b) Availability of Other Lands for the Purpose Sought to be Achieved

The Resource Management Plan considers all BLM-managed lands located within the Glennallen Field Office boundaries, including selected lands. Conveyed lands, however, cannot be considered for management. No other lands within the District boundaries are available for meeting the BLM's multiple use mandate.

(c) Other Alternatives That Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The only alternative that would eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes would be an alternative that prohibited any activity that conflicted with subsistence use or subsistence users. However, the BLM operates under a multiple use mandate that prevent management of resources based on single resources, such as subsistence.

(2) *Social and Economics*

The interpretation of this alternative's affect on economy is based on these assumptions and interpretations:

- Most withdrawal orders would be modified or terminated to allow mining and oil and gas exploration and development on unencumbered Federal land.
- One to three additional small placer mines would open on BLM-managed lands, and a large mine would open on State lands north of the Denali Highway.
- Natural gas discovery and development would occur within 5-15 years.
- Commercial timber sales would be offered on a maximum of 144,000 acres over the planning period.
- In five years, the land base in the planning area would be at least 75 percent smaller as a result of land conveyance.
- Mining-related revenue sharing is theoretically possible only with the Matanuska-Susitna borough, as only they have power to tax. This would only involve State-selected land within the borough boundary.

In summary, the implementation of Alternative D would have the following economic effects:

- PLO 5150, which segregated the transportation and utility corridor from further appropriation, would be maintained, except for 83,000 acres to be conveyed to the State. The effect of this decision is described above and would have minimal impact on moose and caribou harvest on federal lands.
- One to three small placer mines would open 5 to 15 years after the revocations, rejections, and conveyances are completed. 5-15 placer mining jobs would be created beginning approximately 5 years from the end of this planning process. These jobs may be created on State mining claims or on private land by agreement or lease if State and Native conveyance is complete.

- Oil and gas exploration and development and effects will be the same as Alternative B.
- Mining related revenue from taxes is theoretically possible within the Matanuska-Susitna Borough, through property taxes. This would involve Native and State-selected land within the borough boundary. There is no other BLM managed land in the area.
- In addition, Glennallen may benefit by providing lodging, meals, and other services as a result of exploration or placer mining.
- 10-20 jobs related to timber harvest would be created. The supply of wood products would meet local demand for house logs and firewood through the planning period.
- Recreation and tourism growth would continue at current rates and continue to provide employment opportunities and opportunities for Copper River Basin residents. Some limits would be placed on specific areas on commercial recreation as well as general visitor use; however, this would not affect general trends in recreation use.
- Disposal of lands in the Slana area only to resolve unauthorized occupancy would have insignificant effect on the local economy.

(3) *Environmental Justice*

Same as for Alternative B.

E. Cumulative Impacts

Cumulative impacts result from individually minor but collectively significant actions over time. Actions anticipated over the next 20 years on all lands in the planning area, including private, State, Native corporation, and Federal (USDA FS, NPS) lands, have been considered in the analysis to the extent reasonable and possible. Decisions about other actions occurring within the planning area could be made by many public and private entities, though the location, timing, and magnitude of these actions are not well known. Assumptions about actions outside of the BLM's jurisdiction that are considered in the cumulative effects analysis are listed on page 402 of this Chapter.

1. Issue 1: Travel Management

a) Access

Common to all alternatives, access to public lands would become more difficult as Native corporation entitlements are met. The BLM would maintain existing 17(b) easements and would extend those easements across Native-selected lands where trails currently exist to ensure reservation of easements when conveyance occurs. However, as these public lands become private land, there would be some net loss of access. Future access is somewhat contingent on the resolution of State-recognized R.S. 2477 routes, particularly where they cross Native lands. Whether or not access routes to public land would be maintained in the long-term as a result of those determinations cannot be resolved in this planning effort.

b) OHV Management and Trails

Within the planning area, OHV users would be presented with a mix of opportunities, varying degrees of trail maintenance, and varying off-road regulations. OHV management within the 13 million acres of Wrangell-St. Elias National Park and Preserve would continue as limited to OHVs, with travel limited to designated trails. Native lands would be restricted in most areas, with general public use limited to easements that provide access to public lands across Native lands. As Native Corporation entitlements are met, this could mean a net loss of trails that are currently available on Native-selected lands. For the most part, State lands would remain open to OHVs, subject to conditions for generally allowed uses. Exceptions would be State lands within TLAD and other small areas where OHV use may be regulated by Special Use Land Designations. Other State lands may be subject to Controlled Use Area regulations, where OHV use may be limited to accomplish game management objectives or to provide a particular type of hunting experience.

In general within the planning area, OHV use is expected to become more restricted over the planning period, regardless of the alternative selected by the BLM. Consistent with ANILCA, allowance would still be made for access to subsistence resources by traditional means.

With an increase in OHV users and improvements in OHV technology, the accessibility of remote areas that were previously inaccessible would increase. As this occurred, the motorized and non-motorized user searching for a primitive recreation experience would have to venture farther into the backcountry to obtain the same primitive experience.

c) Roads

Regardless of the alternative selected by the BLM, road construction is expected to increase slightly over the planning period on State, Native, and private lands within the planning area. New roads would be used for access to private lands, mineral exploration and development, and forestry activities.

2. Issue 2: Recreation

a) General Recreation

The planning area currently provides a tremendous diversity of recreation experiences, conditions that are expected to continue over the planning period regardless of the alternative selected for BLM-managed lands. The largest influence on recreation experience within the planning area is use of OHVs. Without management and some limitations on OHV use, the general trend, in OHV-accessible topography, is for primitive and semi-primitive recreation experiences to trend towards semi-primitive motorized and roaded natural experiences. However, much of the planning area is dominated by steep topography, wetlands, or dense vegetation that is inaccessible to most OHVs; these areas would be maintained to provide for primitive and generally inaccessible recreation experiences, regardless of the BLM's selected alternative. Helicopter-supported commercial recreation ventures and winter snowmachine use have the potential to access and potentially alter experiences in some of these areas. It is assumed that 13 million acres within the Wrangell-St. Elias National Park and Preserve would continue to be managed mostly for remote fly-in primitive experiences, with the exception of the two access roads into the Park and the Kennicott/McCarthy area.

The Copper River Princess Lodge in Copper Center was opened in 2001. This lodge provides a land "base" for cruise ship passengers who are bused around the road-system portion of the State. The lodge hires local concessionaires to provide fishing,

local touring, or sightseeing experiences in the Copper Basin. These activities, most of which take place on State highway right-of-ways or non-BLM managed lands, have little impact on primitive back-country experiences. The general effect has been a seasonal increase in use levels along the highways and at highway rest stops, trailheads, scenic pullouts, etc. Potentially, this increased use, along with normal anticipated user trends, can change a roaded natural experience to a rural experience when more facilities are necessary to handle increased user impacts. While not yet a factor at the Copper River Princess Lodge, aerially-supported activities associated with the cruise ship industry have had major effects on recreation experiences in other portions of Alaska. Seasonal (summer) flightseeing, particularly using helicopters, could provide quick and “easy” access to tourists to remote, primitive experiences. Combined with an increasing trend in other motorized activities, this would accelerate a change from a primitive experience towards semi-primitive motorized.

There continues to be a need in the planning area for facilities to provide positive recreation experiences for motorists traveling the State highways. The State continually struggles with funding to support construction and especially maintenance of such facilities as waysides and outhouses for the motorist. Alternatives B and D would help address this need, but without a well-funded State recreation program, this rapidly growing need would not be met.

3. Issue 3: Natural and Cultural Resources

a) Soils

There would be a slight increase in activities that potentially cause soil disturbance or erosion on State, Native, and private lands within the planning area. Such activities would include an increase in the number and miles of OHV trails on State lands, as well as increased mineral exploration and development and forestry activities on State and Native lands. These activities would occur regardless of the alternative selected by the BLM. These impacts would have direct and indirect effects on soils but very little cumulative impact on site potential and soil productivity when combined with any actions proposed on BLM lands under any alternative. This conclusion is based on the small footprint of most development activities relative to the total planning area and the application of standards and guidelines described in State DNR Area Plans.

b) Water Quality

Under Alternatives C and D, water quality should improve over the long-term through management actions proposed in the alternatives, adoption of ROPs and Stips, and as a result of participating in cooperative planning efforts on a watershed basis with other

land management agencies. Actions on adjacent lands under other ownerships that produce sedimentation or nutrient loading into streams that then flow through BLM-managed lands, or inappropriate storage containers, small dumps or other potential sources of contamination from activities on non-BLM-managed lands could impact water quality in certain instances. Increased powerboat use in unregulated State waters could adversely impact water quality for short periods during peak use. Short-term cumulative impacts could occur as the result of drought. Changes in any flow regime across BLM-managed lands could result from actions taken on other jurisdictions.

c) Air Quality

Smoke from prescribed and wildland fires burning on State, Federal, Native, and private lands within the planning area or in other parts of the State could cause air quality to deteriorate in the local airshed. Large wildland fires or escaped prescribed fires could occur simultaneously, resulting in an increase in air quality degradation caused by separate events.

No other anticipated activities on State, Native, or private lands would have the impacts to air quality on the scale of fire activities.

d) Wildlife

(1) Travel Management and Recreation

Over the planning period, OHV management is expected to remain constrained within Wrangell-St. Elias National Park and Preserve and on private lands (including Native Corporation lands). State lands are expected to remain relatively open for OHV uses, where there would continue to be unmanaged proliferation of OHV trails. Over the planning period, habitat loss resulting from varying degrees of OHV use and regulation would be minor to insignificant, based on the amount of actual physical disturbance versus acres of available habitat. However, motorized access limited only by physical barriers would eventually lead to heavy hunting pressure and a subsequent drop in bull/cow ratios for moose and caribou, loss of security or refugia areas, and possible depletion of herd health during critical winter months. If these effects played out on State lands accessible to OHVs, lands with more regulated OHV management (such as lands managed by the National Park Service, Native Corporations, or the BLM under Alternatives C and D), may, over time, serve as wildlife refugia.

Increased road construction is expected to occur over the planning period on State lands to facilitate mineral exploration and development. Unless located through critical winter or calving ranges, a slight to moderate increase in roads should not significantly reduce available habitat. However, secondary effects from roads such as increased access, increased proliferation of OHV trails, increased hunting and recreational

pressure, and increased resource development and activity, could displace wildlife from traditional use areas or migration routes.

Limiting commercial recreation uses or general visitor use in specific areas under Alternative C or D could lead to increased commercial recreational uses on State lands. This shifting of use could increase impacts to wildlife associated with these activities, helicopter-supported recreation activities in particular. Limiting general visitor use in specific areas could lead to increased use on State lands in more remote areas.

(2) *Vegetation Management*

Fire management in the planning area occurs under cooperative interagency planning. Therefore, fire impacts (positive or negative) occur across land status. Fire management options can be adjusted on an annual basis to meet resource objectives (such as habitat improvement for moose balanced with maintenance of desired winter range for caribou).

Maximum forest management activities outlined in Alternative B, combined with increased forestry practices and associated road construction on State and Native lands, could lead to a short-term reduction in big game security areas, fragmentation of specific habitats, increase in road density, and short-term loss of late-seral habitat in specific areas. Under this scenario, proposed forestry practices on BLM-managed lands would need to be adjusted to account for short-term negative impacts on other lands from large-scale forest practices.

(3) *Lands and Realty Actions*

Land disposals on State lands in the planning area have the potential to negatively affect wildlife and wildlife habitat. These impacts would occur through increased demand on wildlife and impacts on habitat from access roads, powerlines, and home construction.

(4) *Mineral Exploration and Development*

Minerals exploration and development at the levels described in Alternative B, combined with increased activity on State and Native lands, could lead to habitat loss and wildlife displacement, particularly if activities were to occur in critical habitat areas such as calving areas or wetlands that provide critical waterfowl habitat (such as the West Fork Gulkana area). If permanent road construction is necessary to facilitate development, habitat loss and wildlife displacement could occur even with seasonal constraints.

(5) *Sensitive Status Wildlife Species*

Cumulative impacts result from actions on adjoining lands under other ownerships that affect habitat availability and levels of disturbance. The greatest factor influencing

Sensitive Status wildlife Species in the planning area is the scattered land ownership pattern. Since most species of concern are wide ranging, activities on adjoining ownerships may compromise or enhance efforts on BLM-managed lands. For example, seasonal constraints on oil and gas activities within trumpeter swan breeding habitat may be compromised if not practiced consistently on adjacent private or State-owned lands.

While public land road densities are minimized under all alternatives except for Alternative B, roads on other ownerships may increase habitat fragmentation and decrease habitat quality for Sensitive Status Species.

e) Fish

A continuation of current water and land use practices, by private, State, and other Federal agencies would continue to affect fish habitat within the planning area. Higher intensity OHV use, timber harvest, and mineral development or exploration on lands upstream from BLM-managed lands within a watershed could continue to be a concern due to sediment and water quality issues that influence the quality of fish habitat downstream from the source. Habitat improvement gains through more intensive management of recreation activities as proposed under Alternatives C and D could be offset or enhanced by regulatory sport-fishing changes made by ADF&G. Coordination would continue to be essential.

Coordinating with regional planning actions and conducting interagency watershed planning efforts could help protect important fisheries values in watersheds such as the Gulkana or Copper River.

Direct and indirect effects on fish habitat and fish populations from anticipated levels of oil and gas development on BLM-managed lands is expected to be insignificant, for reasons discussed in the preceding analyses. However, the Trans-Alaska pipeline crosses BLM-managed lands in this planning area and crosses rivers that are vitally important for Copper River salmon stocks (such as the Gulkana, Klutina, and Tazlina rivers). The 2002 Final Environmental Impact Statement for the Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way discusses the anticipated effects to fisheries of a spill from the pipeline in great detail. Generally, the effects of a crude oil spill from the TAPS would be a function of the amount of oil spilled (relative to stream discharge), the duration of exposure to spilled oil, and the sensitivities of the fish species and life stages present at the time of the spill. A major spill of oil from TAPS into a waterway as a result of a failure or guillotine break in the pipeline could result in severe effects on fish. Such spills are considered very unlikely to unlikely. Smaller spills would have less effect on fish resources but would have a higher probability of occurrence (BLM 2002). Severe effects on fish would have a major economic impact on the Copper Basin and Cordova, which utilize Copper River salmon for subsistence, commercial, and sport fishing.

(1) *Special Status Fish Species*

Impacts would be the same as those described in the preceding two paragraphs.

f) Cultural Resources

Cumulative impacts to cultural resources could occur through incremental degradation of the resource base from a variety of sources that reduce the information and interpretive potential of historic and prehistoric properties, or that affect traditional cultural values important to Native Alaskans. Other regional resource, land use, and economic development planning efforts could affect the types and intensity of uses on private, State, or other Federal lands within the planning area and could therefore potentially affect the regional cultural resource data base. Development of lands that are not protected by Federal or State cultural resource statutes and regulatory protections could decrease the regional resource base and potentially limit management options within the planning area. Restrictions on recreational activities in other areas, regional population growth, and increases in current levels of resource extraction and development may increase the use intensity within the planning area, potentially affecting cultural resources. Coordinating with regional planning actions could help protect important cultural resource values.

g) Paleontological Resources

Impacts would be similar to those described in the *Cultural Resources* section in the previous paragraph.

h) Visual Resources

Increased timber harvest and mineral development on State, Native Corporation, or private lands and the occurrence of wild and prescribed fires on adjacent lands would continue to affect the visual features of form, line, color, and texture at the landscape level. These changes would influence the design of similar projects on adjacent BLM-managed lands where repeating these basic elements is an objective of the visual resource management class where the project is implemented.

i) Designation of Areas of Critical Environmental Concern

Impacts from activities implemented on adjacent land under other ownership could create additional cumulative impacts to relevant and important values. In addition to the

effects described for each area by alternative, beginning on page 540, the following cumulative effects could be anticipated:

- Delta bison calving area: This area would see minerals development on adjacent State lands. While impacts to the calving area would be minimal, access needs and rights-of-way for pipelines or powerlines could negatively impact habitat in the area.
- Nelchina caribou calving area: This area consists of predominantly State-selected lands. The Susitna Area Plan (ADNR and ADF&G 1985) recognizes the value of the area for calving habitat, but allows for mineral exploration and development and open OHV use. Large scale mining or oil and gas development in the area, with associated roads and infrastructure, could displace calving caribou despite the implementation of seasonal constraints.
- West Fork Gulkana area: This area consists of predominantly State-selected lands. The Copper River Basin Area Plan (ADNR and ADF&G 1986) recognizes the value of the area for providing trumpeter swan habitat. Some uses are constrained but mineral exploration and development is still permitted. Large scale oil and gas development in the area, with associated roads and infrastructure, could alter nesting habitat and displace individual nesting pairs of swans despite the implementation of seasonal constraints.
- Bering Glacier RNA: This area is bordered by National Park Service, USDA Forest Service, and State lands to the south. Forestry activities are constrained by the Yakataga Game Refuge, which is managed by the State. Mineral exploration and development could occur on adjacent State lands along the coast.

The adoption of ROPs and Stips, as well as the designation of special areas such as ACECs, on BLM-managed lands is analyzed for each alternative in the preceding segments of this chapter. In areas where BLM-managed lands are commingled with other land ownerships, positive effects described through adoption of specific measures could be negated if similar measures are not adopted on commingled or adjacent lands. In most areas, other managing agencies recognize the specific values for which the BLM is attempting to manage, and appropriate measures would be taken.

j) Wild and Scenic Rivers

Resource development activities adjacent to the Delta and Gulkana Wild and Scenic River corridors could impact the outstandingly remarkable values for which the rivers were designated if activities were not carried out utilizing measures sensitive to protecting those values. This is a particular concern on the Delta River, where high mineral potential on adjacent State lands could result in mineral development on those adjacent lands. While not impacting values within the corridor directly, adjacent development could negatively impact visual resources, particularly in areas adjacent to the wide-open tundra-dominated scenic portion of the river. Access routes for roads,

pipelines, or powerlines across or adjacent to the river corridor could negatively impact visual resources as well as primitive recreation experiences.

Mineral development (particularly oil and gas development with its associated roads and infrastructure) adjacent to the Gulkana Wild and Scenic River corridor could negatively impact visual resources as well as opportunities for a primitive recreation experience on the river.

k) Climate Change

Changes in the vegetation cover have been documented on the Kenai Peninsula in south-central Alaska, an area with similar vegetation as the planning area. There is a significant landscape shift from wetlands to woodland and forest vegetation types. Woodland or forested areas have increased from 57% to 73% between 1950 and 1996 while wetlands have decreased from 5% to 1% (Klein 2005). Aerial photographs reveal a ring of new vegetation taking over land that used to be part of kettle ponds showing the impact of a drier and warmer climate (Klein 2005). This shift will have impacts on waterfowl and migratory birds who utilize Alaska's wetland areas for nesting as well as animals that depend on a tundra, low shrub or lichen habitat for food such as caribou.

Although no formal studies on the effects of climate change have been completed for the planning area, it can be assumed that similar changes and impacts of global climate change could be observed and will continue to alter the sub-arctic ecosystems and landscape characteristics. In particular, BLM will need to be sensitive to changes in vegetation and how those changes affect habitat. As changes occur, BLM can work within the interagency fire group to adjust suppression classes, if necessary, to adapt to changing conditions. BLM will also need to be aware of and adjust to changing permafrost and soils conditions. These will be site-specific considerations that will need to be considered in trails management, pipeline construction, or any ground-disturbing activity. The Required Operating Procedures described in Appendix C are designed to adapt to changing site-specific conditions so that protection will still be provided to soil, water, and vegetation resources.

Because climate change must be viewed from a global perspective, the magnitude of emissions potentially contributed by any proposed activities in the Planning Area needs to be viewed in that context. Activities associated with oil and gas or mineral exploration and development, recreation, prescribed burning, or forestry would produce some of the greenhouse gases. The incremental contribution of greenhouse gases from the proposed alternatives in the Planning Area would be minor when compared to total greenhouse gas contributions.

4. Issue 4: Lands and Realty

Effects from disposal, acquisition, and exchange proposals described for BLM-managed lands in any alternative are minor compared to the resolution of land status through continued land conveyances and meeting of Native Corporation and State entitlements. The recently signed Alaska Lands Transfer Acceleration Act (P.L. 108-452) will facilitate the conveyance process, with a target of completing conveyances by 2009. Once entitlements are met, land exchanges may be considered to consolidate land ownership patterns.

The number of land use authorizations, particularly rights-of-way and permits, is a function of demand for these uses. Additional future development of adjacent Federal, State, and private lands would likely result in additional requests for and approval of land use authorizations for facilities such as roads, utilities, and communication sites.

5. Issue 5: Vegetation Management

a) Forest and Woodland

Within the planning area, forestry practices are expected to increase, particularly on Native lands, with a slight increase on State lands. This increase, combined with the selection of any of the alternatives, would have only a minor impact when expressed in terms of change to vegetation cover types throughout the planning area. Even at a maximum activity level, these increases would change less than 4 percent of the total cover classes within the planning area. Short-term effects are mostly positive for wildlife habitat improvement, with a temporary increase in shrub-dominated cover types. Long-term effect would be an increase in age and cover type diversity within the planning area.

Increased development and settlement on private lands would convert woodland cover types to grass or shrub-dominated or cropland. Even at maximum development, this would impact less than 2 percent of the lands within the planning area (Copper Valley Economic Council 2003).

Wildland fire and prescribed fire have more potential than any other activity in the planning area to make landscape-level changes to vegetation composition. Alternatives B and D propose prescribed burning of up to 1.5 million acres. A large portion of this burning would occur on State-selected and State lands and would be conducted with interagency cooperation. At this scale and combined with an expected increase in wildland fire in the area, significant changes could occur in vegetation composition in woodland cover types over the planning area. Late-seral black and white spruce cover types would be interspersed with a mosaic of early seral shrub-dominated cover types. Dependent on size and intensity of wildland fires, prescribed fire objectives may need to

be tempered and management options may need to be adjusted to maintain quality caribou winter range. This would continue to be a coordinated and interagency effort to ensure landscape-level management.

b) Riparian Vegetation

Adoption of Alternative A or B, combined with increased resource development, settlement, and OHV activities on other lands within the planning area, could put some riparian areas into functioning at risk or non-functional categories. Most impacts to riparian areas and vegetation are local and development footprints are fairly small. However, mineral exploration and development or large-scale forestry activities without standards or stipulations to protect riparian vegetation could result in impacts to riparian vegetation and functionality.

c) Noxious Weeds and Invasive Plants

Noxious weeds are currently not a major issue within the planning area. However, preliminary inventory has revealed the presence of noxious weeds in some locations and non-native species in many areas. Common to all alternatives, the BLM would continue inventory and take measures to prevent the spread of noxious weeds. The spread of noxious weeds would potentially be controlled in some areas and spread more rapidly in others. Factors affecting the spread and control of invasive species include the frequency and amount of motorized traffic and recreational use on public lands in the planning area; development occurring on private lands adjacent to BLM lands; and the type of control or inventory actions taken on Federal, State, Native, and private lands. Any actions that limit the treatment or prevention of noxious weeds on public lands may limit the effectiveness of treatments on lands under other ownerships. Over the course of the planning period, the cumulative effects of reducing the effectiveness of control on noxious weeds and invasive species could decrease the amount and quality of native forage for wildlife and contribute to soil erosion and increased sediment loads in streams.

d) Sensitive Status Plant Species

The primary uses and management practices on lands adjacent to BLM-managed lands would have the potential for impacting Sensitive Status plant populations and habitats. Very little inventory exists for Sensitive Status Species, and current locations are mostly unknown except within portions of Wrangell-St. Elias National Park and Preserve. Particularly on private lands (including Native corporation lands), complete eradication of individuals or small populations could easily occur as a result of resource development projects or settlement. The potential for loss of individuals or small populations on other lands emphasizes the importance of continued inventory and efforts to protect Sensitive Status plant Species on BLM-managed lands, which would occur under Alternatives B, C, and D.

6. Issue 6: Leasable and Locatable Minerals

a) Leasable Minerals

The cumulative impacts to oil and gas resources would be the removal of the resources by producing wells on leases with the fewest restrictions and lowest operating costs. The cumulative impact to Federal leases would be a reduction in lease value resulting from stipulations and regulations. The cumulative impacts to lease developments would result from a reduction in wells drilled on leases encumbered with stipulations, an increase in wells drilled on leases with minimal constraints, and an increase in operating costs because of land use decisions, lease stipulations, and regulations. Restrictions on Federal leases could impact the leasing and development of adjacent non-Federal leasable minerals. If an exploration company cannot put a block of leases together because of restrictions on Federal leasable minerals, the private or State minerals may not be leased or developed either. Leasing of Federal minerals on the other hand, could encourage the leasing of private or State minerals.

b) Locatable Minerals

Impacts to locatable minerals that are individually minor may cumulatively reduce exploration and production of commodities from public lands. Factors that affect mineral extraction and prospecting include, but are not limited to, such things as permitting and permitting delays, regulatory policy, public perception and concerns, travel management, transportation, mitigation measures, proximity to sensitive areas, low commodity prices, taxes, and housing and other necessities for workers. Many of these issues are issues over which the BLM has no control. Most of these issues result

in additional costs and/or permitting delays that can individually or cumulatively add additional costs to projects.

Public land that currently has no access could reduce the amount of mineral exploration and development that may occur. Mineral resources in other ownerships may not be developed if the adjacent public lands are withdrawn from mineral entry because the deposit may not be economically feasible to develop if it crosses ownerships and only a portion is available for development.

Overall, Alternative C would be the most restrictive to mineral developments and could result in the most cumulative impacts. It proposes the most acres be maintained as withdrawn from mineral entry, the most areas limited or closed to motorized travel, and the highest protection to other resources.

7. Issue 7: Subsistence/Social and Economic Conditions

a) Subsistence

Assuming increased resource development and settlement on State, Native Corporation, and private lands in the planning area, adopting management described under Alternative A or B could result in significant impacts to subsistence resources. Alternatives A and B make no attempt (except for in limited areas) to manage OHV use. Continued unmanaged proliferation of OHV trails would lead to increased competition for subsistence resources, additional disturbance to areas that serve as refugia for caribou and moose, and continued habitat degradation. This combined with a moderate increase in resource development with associated roads and infrastructure could cause critical habitat loss or displacement of some animals from traditional migration routes. Increased access to subsistence resources would be offset by increased competition with recreationists and sport-hunters.

b) Social and Economic Conditions

Cumulatively, the potential economic benefits (in terms of employment opportunities and jobs created) could easily double dependent on resource development levels, particularly on State lands. Construction of a natural gas pipeline within the existing transportation and utility corridor (or alternate routes) on State and Federal lands could provide job opportunities and economic benefits over and above what is described for each alternative.

The Pogo Mine northeast of Delta Junction will increase direct and indirect employment in the Fairbanks NSB by about 1 percent. (EPA, 2003). However, mine workers are not

required to live locally, or even in the borough. 25% of mining industry workers are nonresidents. No effect upon employment within the planning area is foreseen (Hadland 2005). The Man prospects currently employ about ten workers per year. There is no data on a prospective developed project.

The Alaska Natural Gas development Authority (ANGDA) applied to the State of Alaska to construct a pipeline from the Glennallen area to a proposed terminus near Wasilla, Alaska. The pipeline is to transport gas from North Slope to market in Southcentral Alaska. However, the gas line is important to development of a field in the planning area, will be used if constructed. If it is not constructed gas may not be moved from the planning area as cost will be too high. Cost of gas project estimated at \$362 million, compressor and terminals \$80 million. The labor force is estimated to be 619 (Summer) and 686 (winter). Construction would take approximately two years, with the bulk of labor input in construction for one year. According to Hadlund 2005, 22.7 to 28.2 of oil and gas and oilfield service workers are nonresidents. Labor cost is estimated at \$746,501 total. Information on the proposed line may be found on the Joint Pipeline website at <http://www.jpo.doi.gov/ANGDA/ANGDA.htm>

The Copper River Basin has qualified as a potential borough, and formation of a borough in the area is being pushed by some State legislators (even though it is resisted locally). Formation of a borough could increase interest in resource development on BLM-managed lands as a source of revenue.

c) Environmental Justice

No cumulative impacts have been identified.

F. Irreversible or Irretrievable Commitment of Resources

1. Issue 1: Travel Management

No irreversible or irretrievable commitment of resources has been identified.

2. Issue 2: Recreation

No irreversible or irretrievable commitment of resources has been identified.

3. Issue 3: Natural and Cultural Resources

a) Soil

Erosion and loss of shallow soils could result in irretrievable and irreversible commitment of a resource, as once soils have eroded it could take thousands of years for new soils to form. Because of the lack of proposed OHV management under Alternatives A and B, these losses are more likely to occur under these two alternatives.

b) Water Quality

Irretrievable or irreversible commitment of water resources could occur if implementation of any of the alternatives altered the channel morphology of particular streams so they could not restore themselves through natural processes or be restored through other measures. This is not anticipated under Alternative B, C, or D because of the ROPs that would be applied. Without adoption of the ROPs, irretrievable or irreversible loss of water resources could occur under Alternative A.

c) Air Quality

No irreversible or irretrievable commitment of resources has been identified.

d) Wildlife

Both Alternatives A and B would result in the irreversible and irretrievable commitment of wildlife resources in that disturbance or displacement of wildlife from preferred habitats and significant losses of wildlife refugia would occur due to the continued unmanaged proliferation of OHV use.

Under Alternatives B and D in the Slana disposal area, habitat would be fragmented and wildlife species would be permanently displaced from preferred habitat (both seasonally for breeding purposes and yearlong for less critical life phases).

(1) Sensitive Status Wildlife Species

One of the criteria for designating Sensitive Status Species is to prevent the irreversible and irretrievable loss of species and their habitat. The combination of land disposals, resource development levels in sensitive habitats, and lack of OHV management in Alternative B could lead to such losses of habitat for specific local populations such as certain species of migratory birds.

e) Fish

Actions that alter an aquatic community sufficiently enough to change the potential of a particular stream could represent an irreversible or irretrievable commitment of resources. The only reasonably foreseeable activity that would occur within the range of alternatives considered would be placer mining or large scale open pit mining, which are more likely to occur under Alternatives B and D.

(1) Sensitive Status Fish Species

Loss or decline in quality of aquatic habitat occupied by Sensitive Status fish Species (steelhead trout) could cause a population to die out, representing an irreversible or irretrievable commitment of resources. This is not anticipated under any alternative.

f) Cultural Resources

Management measures provide a systematic means to address direct impacts on cultural resources from authorized projects and activities. Mitigation through data recovery investigations at archaeological sites would recover information pertinent to current research concerns, but would also permanently remove the resource from future research and interpretive use, which would constitute an irretrievable and irreversible commitment of these resources. Any management actions that cause the inadvertent

destruction of a cultural resource or make them susceptible to illegal collection could lead to the loss of these resources and would be an irretrievable and irreversible commitment of these resources. This would be more likely to occur under Alternatives A and B, where very limited management of OHVs is proposed. Also, any management action that disposes of lands with cultural resources would be an irretrievable and irreversible commitment of these resources.

g) Paleontological Resources

Under all alternatives, there would continue to be impacts on paleontological resources associated with unauthorized activities such as OHV use, dispersed recreation, land disposals, and vandalism. Unauthorized activities, dispersed activities, and natural processes could cause unmitigated impacts on paleontological resources that would result in an irreversible and irretrievable loss.

h) Visual Resources

No irreversible or irretrievable commitment of resources has been identified.

i) Designation of Areas of Critical Environmental Concern

No irreversible or irretrievable commitment of resources has been identified.

j) Wild and Scenic Rivers

No irreversible or irretrievable commitment of resources has been identified.

4. Issue 4: Lands and Realty

BLM-managed lands or interests in lands disposed of through the land ownership adjustment program would likely be unavailable to the BLM for the life of the plan or longer, and would represent an irreversible and irretrievable commitment of resources.

For Alternatives C and D in which right-of-way avoidance and exclusion areas have been identified, the designation of such areas would essentially preclude the issuance of new rights-of-way in these locations.

5. Issue 5: Vegetation Management

a) Forest Products

Fire suppression in forest and woodland cover types has led to an accumulation of fuels and beetle-kill timber, making these forests more susceptible to stand replacing fires. The loss of forest products from stand replacing fires would be considered an irreversible, and in some instances, irretrievable commitment of resources if the fire burned extremely hot over a long period of time.

b) Forests and Woodland

A decrease in the amount of forest and woodland vegetation resulting from any amount of vegetation treatments could be considered an irreversible, but not irretrievable, commitment of resources given the time required to regenerate this vegetation type.

c) Riparian and Wetland

The loss of riparian function can compromise the ability of riparian and wetland areas to resist degradation. Habitats in nonfunctional condition may have sustained sufficient degradation that they may no longer be capable of being restored to original site potential. Currently all riparian areas on BLM-managed lands within the planning area are in functioning condition. Loss of function would only be anticipated through activities such as placer mining or large-scale open pit mining, activities that would be most likely to occur under Alternatives B and D. With appropriate reclamation measures proposed under the ROPs in Alternatives B, C, and D, these activities would result in irreversible, but not irretrievable, losses. Without appropriate reclamation measures, activities would result in both irreversible and irretrievable losses.

d) Sensitive Status Plant Species

Irreversible and irretrievable impacts to individual Sensitive Status plants or isolated populations may occur to unknown individuals or populations as a result of surface disturbing activities such as mineral extraction, road construction, or OHV use. Pre-project botanical inventories identified under the ROPs would minimize, but not eliminate these impacts to sensitive species. These impacts would be most likely to occur under Alternative B.

6. Issue 6: Leasable and Locatable Minerals

a) Oil and Gas Leasing

The production of oil and gas results in the irretrievable and irreversible loss of those natural resources. Most, if not all, surface disturbance and use can be restored through proper reclamation techniques.

b) Locatable Minerals

The removal of minerals from public lands results in the irretrievable and irreversible loss of those natural resources.

The maintenance of withdrawals that prevent locatable mineral entry would cause an irretrievable, but not irreversible, loss of mineral extraction during the life of the plan. Some proposed withdrawals fall in high and moderate mineral potential areas.

c) Mineral Materials

The extraction of mineral materials from lands within the planning area would be an irreversible and irretrievable commitment of resources.

7. Issue 7: Subsistence/Social and Economic Conditions

a) Subsistence

Conveyance of the transportation and utility corridor to the State, as proposed under Alternative B, would constitute an irreversible and irretrievable loss of area available for subsistence hunting under Federal subsistence regulations.

b) Social and Economic Conditions

Maintenance of withdrawals that prevent locatable mineral entry or mineral leasing constitutes an irretrievable, but not irreversible, loss of mineral extraction and associated economic benefits during the life of the plan. Loss of primitive recreation opportunities, including the wildland setting character and resulting experiences and benefits, result in an irretrievable and irreversible loss of income and jobs to the local, regional, and state tourism economies and the commercial businesses that depend on those opportunities.

G. Unavoidable Adverse Impacts

Unavoidable adverse impacts are either impacts that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur as a result of proposed management under one or more of the alternatives, while others are a result of public use of BLM-managed lands within the planning area. Potential unavoidable adverse impacts are generally long-term and difficult to quantify. Only those issues or topics that would have unavoidable adverse impacts are included here; if an issue or topic is not included, no unavoidable adverse impacts would occur.

1. Travel Management

Travel off of roads and trails would continue to cause soil compaction and loss of protective vegetative cover, thereby increasing soil erosion. These activities would occur even under the most aggressive trails management scenario. Any facility developments or utility and road facilities that are not properly restored even after mitigation measures are applied could result in increased soil erosion.

2. Recreation

Changes in the amount of recreational visitation and associated duration and patterns of use could result in increased conflicts between users and unanticipated changes in resource conditions.

3. Cultural Resources

While measures are in place to identify threats to cultural resources and prioritize management actions, some impacts would be unavoidable. There would continue to be impacts to National Register of Historic Places-eligible, unevaluated, and undiscovered cultural resources associated with dispersed recreation activities, OHV use, vandalism, and other types of activities not authorized by BLM. Natural processes such as erosion and natural decay or deterioration could also result in unmitigated damage to cultural resources.

4. *Vegetation Management*

Vegetation treatments, mineral development, and other authorized activities as well as unauthorized travel could cause short-term displacement of wildlife during the activity or treatment, and while the treated area regenerates or recovers. There could be short-term increases in stream sedimentation and soil erosion from these activities as well.

Large scale, stand replacing wildland fires that are expected to occur within the planning area over the life of the plan could quickly change the scenic quality of the landscape without regard to visual resource objectives. Scarring of the landscape could also occur from cross-country travel.