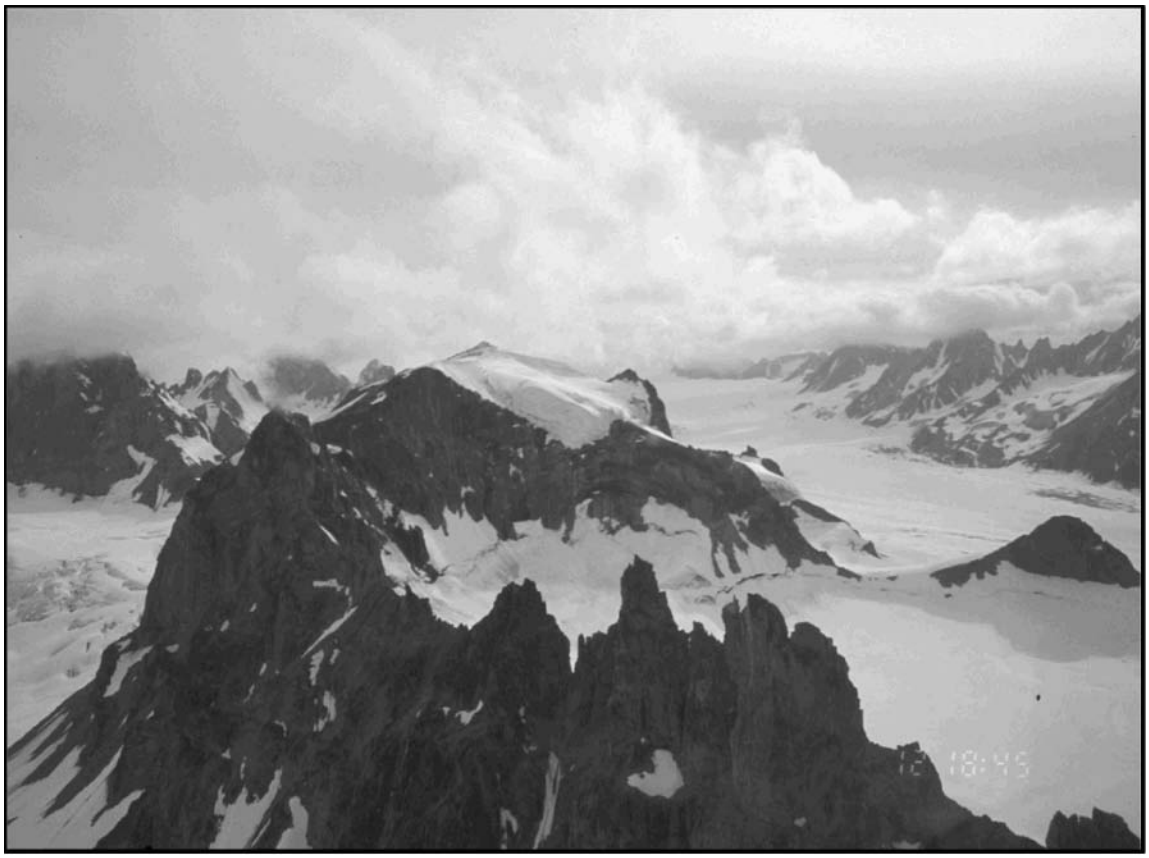
Chapter 4:

Environmental Consequences



4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter describes the predicted consequences, or potential effects, on the physical, biological, and human environment from implementing the alternatives described in Chapter 2. The chapter begins with a summary of the methods and approach used for the effects assessment, describes the type of effects analyzed, and summarizes the assumptions used during the analyses.

Effects are defined as modifications to the environment, as it presently exists, that are brought about by external actions or events. These effects may be beneficial or adverse, and result from the action directly or indirectly. Effect levels are determined by their magnitude (measure of change), extent (size of change), duration (e.g., temporary, short- to long-term), and likelihood of change. The characteristics of an effect level vary per resource category; however, in general an effect that persists more than a few years would be considered long-term. Effects that would allow the resource to revert back to its predisturbance condition within a few years of the activity would be considered short-term. The magnitude or extent of an effect is dependent upon the current condition of the resource.

4.2 Assumptions and Methods

4.2.1 Methods and Approach

The analysis of direct, indirect and cumulative effects associated with the proposed alternatives is required by Bureau of Land Management (BLM) planning regulations and by the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA). These effects analyses present the best estimates of direct, indirect, and cumulative effects.

The type and level of effects that could result from implementing the alternatives have been identified using the information provided in Chapter 3, which provides a description of the current condition of the environment. Activities that may occur in the reasonably foreseeable future within the Ring of Fire planning area were also considered as part of the analysis of cumulative effects. Effects analyses and conclusions are based on interdisciplinary team knowledge of the resources and the Ring of Fire planning area, information provided by BLM or other agency experts, pertinent literature review, and professional judgment. The inherent difficulty of a broad Proposed Resource Management Plan (PRMP)/Final Environmental Impact Statement (FEIS) such as this is to describe the potential effects from a project action when exact locations of project sites are unknown. Therefore, the analyses in this chapter are often qualitative. Quantitative data, commonly based on past experience, have been included where available. Under each alternative, only the resources or resource uses pertinent to that analysis of effects will be discussed.

4.2.2 Types of Effects

The analyses include three types of effects as described below. *Direct effects* are caused by the proposed action and occur at the same time and place. *Indirect effects* are caused by the proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable. *Cumulative effects* are the effects on the environment resulting from the incremental effects of the proposed actions when added to other past, present, and reasonably foreseeable future actions (RFFAs) regardless of what person(s) or agency (federal or non-federal) undertakes those actions (40 Code of Federal Regulations [CFR] 1508.7 and 1508.8).

4.2.3 Analytical Assumptions

Assumptions and estimates were made to facilitate the analysis of the project effects. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the planning area over the next 20 years. The assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative that is described in Chapter 2. If no assumptions were made for a resource, that resource is not discussed in the following sections.

- Sufficient funding and personnel would be available for implementation of the final decision.
- Implementation of actions from any of the PRMP/FEIS 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 effects 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 effects where data are limited.
- Acreage figures and other numbers used in the analyses are approximate projections for comparison and analytical purposes only. Readers should not infer that they reflect exact measurements or precise calculations.
- State and Native land entitlements will be met sometime within the next five to 10 years as land selections are adjudicated. This will reduce the acreage of current BLM-managed lands within the Ring of Fire planning area.

4.2.4 Resource Assumptions

Air Resources

- Increasing uses of the area for recreation may cause deterioration in current quality of the air, especially during seasons of high visitation.
- The most likely causes of deterioration in air quality in the Ring of Fire planning area are emissions from fire (wildland fire or prescribed), dust from travel on roads, volcanic emissions, and dust and exhaust from construction or development activities.

Soils

- Most of the Ring of Fire planning area lies near the southern boundary of discontinuous permafrost where only rare patches of permafrost exist (Pewe 1975). The effect on soils as a result of a decrease of permafrost is probably negligible.

Water Resources

- Demand for water (quantity and quality), especially in the planning area's clear-water streams and rivers, will increase as a result of increasing recreation use, and increasing population in the Ring of Fire planning area. Water quality requirements would be achieved through the use of the Required Operating Procedures (ROPs).

Fisheries and Aquatic Habitats

- The demand for fisheries resources from increased sport and subsistence fishing will increase in the foreseeable future, 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 effects to habitat quality will increase. BLM will continue to manage to protect and maintain the genetic integrity of Alaska's wild populations of fish.

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, and 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, effects to wildlife populations and habitat are not discrete since actions may benefit one species while having an adverse, or a beneficial, effect 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 improved health of wildlife habitat will increase given the increase in demand for caribou and moose within the planning area. Demands on habitat from caribou and moose will generally increase as ungulate populations increase, though populations will fluctuate over the course of the planning period.

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 protection of species listed under the Endangered Species Act (ESA), as well as for species not yet listed, but of concern, will likely increase. Demand for protection of special status species will increase as inventory indicates specific habitat niches or requirements, and as increased visitor use or development activities place demand on associated habitats.

Vegetation

- 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 sustainable production of forest products. 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 leaf willow for arts and crafts. Vegetation treatments to forests, woodlands, and shrublands would 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.
- 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 in the near future due to fuel loading, and increasing temperatures. Fire suppression efforts will continue in areas of urban interface and where wildland fire would produce undesirable resource effects.

Wetland-Riparian

- 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 increased recreational use. This will result in localized effects to riparian vegetation, but not at levels that threaten proper functioning condition.

Invasive Plant Management

- Inventory efforts will continue to identify specific occurrences of noxious weeds and invasive plants. 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.

Wildland Fires and Fuels Management

Wildland Fire

- Wildland fire frequency, intensity, and complexity are expected to increase over the planning period due to population gains, wildland urban interface expansion, complex land ownership patterns, road improvements, and access development to currently remote areas, more recreational use, vegetation (fuel) conditions, and climate and weather trends. Cooperative interagency fire planning and suppression, as described in Chapter 3, will continue. Management option designations will be changed over time to respond to specific resource or urban-interface concerns.

Fuels Management

- Fuels management techniques will be utilized with more frequency to accomplish habitat improvements and fuels reduction objectives. Wildland fire use and prescribed burn treatments will create mosaic patterns on the landscape, which in turn maintain structure and diversity.

Visual

- 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 Ring of Fire planning area. Increasing tourism will increase the value of scenic views, undeveloped landscapes and open spaces.

Paleontological Resources

- Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable paleontological resources. BLM would continue to mitigate effects to paleontological resources from authorized uses, through project abandonment, redesign, and specimen recovery. Geologic formations with exposures containing vertebrate and non-vertebrate fossils would continue to be affected from natural agents, unauthorized public use, and vandalism.
- The demand for use of both vertebrate and non-vertebrate fossils is expected to increase. The causal-use and collection of non-vertebrate fossils by “rock hounds” and fossil collectors is expected to increase. Scientific interest in vertebrate fossils by the academic community is also expected to remain at current levels or possibly increase slightly.

Cultural Resources

- Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable cultural resources. BLM will continue to mitigate effects to cultural resources from authorized uses through project abandonment, redesign, and if necessary data recovery investigations in accordance with the 1997 BLM National Cultural Programmatic Agreement and the 1998 Implementing Protocol

with the Alaska State Historic Preservation Officer (SHPO) for managing cultural resources on lands administered by the BLM in Alaska.

- Cultural resources would continue to be found and evaluated for eligibility to the National Register of Historic Places (NRHP) as additional inventories are completed for compliance projects. Eligible cultural resources would 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. BLM will continue to consult with Native tribes and communities, and with 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. Interest from the general public in historical tourism 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.

Forestry

- 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 the population in the Ring of Fire planning area increases. Historically, timber harvests have not exceeded approximately 100,000 board feet annually, typically representing a disturbance of approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest or only slightly higher would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Given the relatively low value and limited demand for the timber in the Ring of Fire planning area, most of the timber harvested would come as an ancillary benefit from other construction projects such as right-of-way (ROW) clearing or other permitted activities. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula.

Grazing

- No livestock grazing currently occurs under permit. It is assumed that no additional requests for livestock grazing authorization will occur. The only anticipated grazing use would be incidental use associated with recreational and commercial use of pack animals for hunting, fishing, and other backcountry recreation. Any authorization for grazing by pack animal will be examined on a case-by-case basis.
- It is anticipated that no requests for reindeer grazing permits will occur. There are no current reindeer grazing authorizations within the Ring of Fire planning area.

Leasable Minerals

- No development of coal, oil shale, phosphate, or geothermal resources is anticipated within the next 10 to 15 years. Oil and gas exploration will likely occur as described in the Reasonably Foreseeable Development (RFD) scenario (BLM 2004r). The RFD scenario predicts activity based on geologic potential, as well as past and present exploration and development, accessibility, and existing infrastructure.

- It is assumed that 1,000 miles of seismic exploration will be conducted on lands within the planning area.
- Based on the history of oil exploration wells drilled in the Cook Inlet Basin, it is assumed that roughly 15 oil exploration wells would be drilled in the planning area over the next 15 years.
- It is assumed that in that period, 26 gas exploration wells would be drilled within the Ring of Fire planning area.
- It is assumed that 60 development gas wells, i.e., wells with existing fields, would be drilled during the next 15 years.
- Coal bed natural gas (CBNG) is considered separately from conventional oil and gas. CBNG in the Cook Inlet Basin would likely occur in the Matanuska-Susitna Valley and in the southern Kenai Peninsula near Homer (Figures 3.7-1 and 3.7-2). Although these locations are part of the mature Cook Inlet oil and gas basin, we consider this a frontier area regarding CBNG exploration due to the limited exploration efforts to date in the Matanuska-Susitna Valley. Under this RFD scenario for CBNG production, recoverable reserves are assumed to be 1.4 trillion cubic feet. For purposes of analysis, we assume that production would be from a single field either in the Matanuska-Susitna Valley or on the southern Kenai Peninsula. The CBNG field would be similar in extent to the former Pioneer Unit (i.e., a field encompassing approximately 50,000 acres of subsurface). To maximize recovery and minimize waste, a 100-acre well spacing would be employed and 500 wells (250 pads or two wells per pad) would ultimately be drilled. Ten percent of these wells would be abandoned as dry holes. Projected short-term acreage disturbance due to CBNG exploration, development, and production under this scenario would total approximately 1,481 acres. Long-term disturbance would be roughly 905 acres.
- It should be noted that BLM's land comprises only a portion of the total estimated disturbance acreage. Total surface disturbance within the Ring of Fire planning area (for all ownerships, not just BLM) of projected short-term oil and gas exploration, development, and production, including CBNG is approximately 2,558 acres. Long-term disturbance would be roughly 1910 acres. BLM-administered lands, selected lands and split estate lands, comprise less than two percent of the area designated as having high oil and gas development potential within the Cook Inlet Basin. If development occurs in this area of the basin, less than 52 acres will be disturbed by oil and gas development, including CBNG, on BLM-administered land, selected lands, or on land where BLM manages the subsurface estate and the surface is privately owned. However, to err on the side of caution, and because it is theoretically possible no matter how unlikely, that all development could occur on BLM-managed land, we have analyzed effects using the acreages of combined potential oil and gas and mineral disturbance (2.558 acres oil and gas disturbance + 60 acres mineral disturbance = 2,618 acres total).

Locatable Minerals

Placer Gold

- Placer gold mining has been the most common type of mining to occur in the Ring of Fire planning area. The RFD for locatable minerals concludes that historical data indicate that smaller placer mines will be more likely to reappear in the Ring of Fire planning area than either medium or large placer mines (Appendix G). Increases in average gold prices would likely be required before any significant placer mining activity were to occur in the Petersville-Cache Creek, Collinsville, Hatcher Pass, and Porcupine Creek areas (historic mining areas) of the Ring of Fire planning area. Regardless of the amount of land made available for mineral entry, development would be in the range of

one to five acres per property including concurrent reclamation, totalling less than 60 acres on BLM land.

Other Deposits

- No lode mineral production is expected to occur on BLM unencumbered lands in the Ring of Fire planning area, though there may be a small potential for disturbance from access roads/airstrips, field and support camps, trenching and drilling activities, and possible powerline construction activities, if development occurs elsewhere and requires use of BLM-managed lands.

Salable Minerals

- Demand for gravel will increase as road maintenance and construction continue on State highways, State lands, Native corporation lands, and private lands. There appears to be an ample supply of sand and gravel located on private lands near communities with existing infrastructure to support development of these resources. BLM lands are generally remote, roadless and not in areas with projected development needs making them less attractive material sources than private lands. While it is unlikely that any salable mineral extraction would occur on BLM-managed lands, if a sale did occur, it would include approximately 10 acres of ground disturbance from extraction of the pit and construction of a road, likely to be less than a mile long.

Renewable Energy

- Considering such factors as the amount and intensity of sunlight, wind velocity, proximity to roads and electric transmission facilities it is anticipated that no applications will be received to permit or lease commercial construction of facilities on BLM-managed lands.

Lands and Realty

Land Use Authorization

- There will be a continued demand for land use authorizations, such as ROWs and various types of leases and permits within the Ring of Fire planning area. The demand for these land use authorizations will fluctuate directly with the degree of economic growth and development occurring within and adjacent to the Ring of Fire planning area. BLM has granted an average of five ROWs per year over the last five years for facilities like driveways, power lines, and short segments of roads. It is anticipated that these numbers will remain constant for the foreseeable future.

Change in Land Ownership

- State and Native corporation land entitlements will be met within the Ring of Fire planning period, with the BLM retaining management on approximately 15 to 25 percent of lands currently selected by State and Native corporations. 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.

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 constant or increase

slightly for the foreseeable future. Access to public lands will decrease slightly as Native corporation entitlements are met and as private lands become more developed.

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 from BLM-managed lands will increase. Current demand for road development is limited due to the nature and location of the lands within the Ring of Fire planning area.

Transportation and Utility Corridors

- No transportation or utility corridors have been identified as a result of this planning effort. The BLM recognizes that they may be proposed in the future and will consider them at that time.

Recreation

- Demand for recreational use of public lands is expected to increase. Because much of the BLM-managed land within the Ring of Fire planning area generally consists of isolated parcels that are not accessible by road, increases will be focused on sport hunting and fishing, recreation OHV use (including snow machines), hiking and canoeing/rafting. Currently, BLM manages 30 Special Recreation Permits (SRPs) within the Ring of Fire planning area. Commercial recreation applications, including heli-skiing and touring, are predicted to increase from the current three, to as many as five applications in the next five years. These are primarily for operations in the Haines-Skagway area in the Southeast region. Other emerging recreational activities include the growing OHV use of the few BLM lands that are road accessible, including the Knik River area.

Off-Highway Vehicles

- 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.
- Much of the OHV use within the Ring of Fire planning area will remain centered in the Knik River area. OHV use in the Knik River area will continue to increase both on and off of established trails. Heaviest use will occur in the generally flat, lowland floodplain of the river valley. These lowland trails are made up of varying components of sand, gravel, and glacial silt, with little vegetation coverage. Many of these sites are subject to ice movement and flooding each spring during breakup, which sometimes obliterates previous trail disturbance.
- Upland OHV use takes place on better-drained sites with existing vegetation and some degree of slope. These trails are more susceptible to damage by increases in vehicle traffic. As these trails become more traveled, they will deteriorate through rutting and eventually become impassible, causing OHV users to seek alternate trail locations thereby increasing surface disturbance in the area. These trails are primarily used to access higher elevations in the area during hunting season.

Wild and Scenic Rivers

- Recreational use of the river corridors being considered for proposed Wild and Scenic River (WSR) designation will increase. If the proposed corridors are designated, prescribed management will protect the Outstandingly Remarkable Value (ORV) for which the rivers were designated, requiring a mix of education and regulatory measures.

Economic

- The economic effect 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.

Social

- The population within the Ring of Fire planning area will increase over the planning period.
- 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.

Environmental Justice

- As a government agency, BLM will maintain a government-to-government relationship with federally-recognized Native tribes within the Ring of Fire planning area. Residents within the Ring of Fire planning area utilize Native and village corporation lands as well as BLM public lands for traditional subsistence activities, and will continue to do so. Through the planning process, BLM has initiated consultation with different Tribal entities. This consultation will continue throughout the planning process.

Subsistence

- BLM will continue to play a role in the management of subsistence resources on public lands. The demand for subsistence resources will increase following current trends.

4.2.5 Treatment of BLM Critical Elements

BLM considers 14 items as “Critical Elements of the Human Environment” that must be addressed during environmental analysis.

Prime or Unique Farmlands are not currently present on BLM-administered lands covered by this plan. The remaining 13 critical elements are addressed pertinent to sections of Chapter 4 that are identified as containing information relating to a critical element. These include: Air Resources, Areas of Critical Environmental Concern (Special Management Areas [SMAs]), Cultural Resources, Environmental Justice, Native American Religious Concerns, Threatened and Endangered Species, Hazardous or Solid Wastes, Water Resources, Wetlands-Riparian, Wilderness, WSRs, Invasive Plants, and Floodplains.

Environmental Justice and Native American Religious Concerns are addressed throughout Chapter 4, where applicable.

4.3 Direct and Indirect Effects

4.3.1 Resources

4.3.1.1 Resources with Effects Common to All Alternatives

The following resources would have similar effects under all four alternatives. In most cases potential direct and indirect effects would be minimal, negligible, or non-existent.

4.3.1.1.1 Air Resources

Much of the Ring of Fire planning area is designated as unclassifiable, with regard to air resources (USEPA 2004a). On some level, air resources in the Ring of Fire planning area will be affected regardless of which alternative is selected. Although there will be varying degrees of effects throughout the planning area, one can expect to find effects of greater magnitude under Alternative B that proposes greater areas for potential mineral development or OHV activity. These activities will often be around population centers and/or various areas of economic or recreational interest (e.g. mineral exploration and extraction or scenic camping locations). However, the scattered nature of BLM lands and low potential for reasonably foreseeable mineral development indicate that effects on air resources would be minimal under all alternatives, and in the case of OHV activity, short-term in nature.

4.3.1.1.2 Climate, Physiography, and Geology

The proposed alternatives would have no direct or indirect effects on climate in the Ring of Fire planning area. Due to the fragmented nature of BLM lands, the low likelihood of development associated with leasable, locatable, and salable minerals (Section 4.2), and the short-term effects associated with OHV use, effects on the physiographic and geologic resources are expected to be negligible.

4.3.1.1.3 Floodplains

The land management actions proposed under any of the alternatives would have minimal effects to floodplains. Alternative B proposes more areas for potential mineral development and OHV activity, so any effects on floodplains under this alternative would be greater in magnitude than under any of the other alternatives. However, the scattered nature of BLM lands and low potential for reasonably foreseeable mineral development indicate that effects on floodplains would be minimal under all alternatives.

4.3.1.1.4 Wildland Fires and Fuels Management

BLM will continue to authorize suppression actions or fuel treatments on BLM-managed land to hinder wildland fire from occurring or spreading to higher management option designation on BLM-managed lands, inholdings or those of adjacent landowners. As a member of the Alaska Wildland Fire Coordinating Group, BLM will continue to work cooperatively with agencies and groups on the development and use of Alaska interagency fire management option classifications, priorities, and to use the established change protocol to modify boundaries and fire management options. There would be no direct, indirect, or cumulative effects to fires and fuels management under any of the proposed alternatives; therefore, no further consideration of effects to fires and fuels management is included in this document.

4.3.1.2 Soils

Potential effects to soil resources can be affected by management decisions, through changing erosive actions of wind and water, or by limiting the productivity of the soil. Soil resources are also linked to water resources because excessive erosion and sediment transportation can degrade water quality and/or habitat.

4.3.1.2.1 Direct and Indirect Effects Common to All Alternatives for Soils

Ultimately, the magnitude of the effects on soils will be a function of the extent and nature of action taken, as well as the soil composition at a particular location.

There is a correlation between loss of organic matter and compaction: soil compaction can lead to loss of organic matter. Thus, the management actions and possible adverse effects described under compaction will also be applicable to loss of organic matter. ROPs, such as limiting overland movement where roads are not available to times when soils are frozen and sufficient snow cover is available to prevent soil compaction, are designed to minimize effects to soil resources.

Hazardous Materials Effects on Soils (Common to All)

The BLM management actions under all alternatives for hazardous materials may beneficially affect soil quality by ensuring adequate protections against the pollution of soil from hazardous materials.

Forestry Effects on Soils (Common to All)

Forested vegetation is integral to maintaining the health of soil resources, particularly due to the ability of vegetation to pump water from the soil, intercept heavy rain and snow before soil degradation occurs, and provide protective cover that minimizes erosion. Timber harvesting can have varying degrees of adverse effects on soils, such as compaction and soil degradation. Historically, timber harvests have not exceeded approximately 20 acres per year within the planning area, with little road construction activity. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvests, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Any effects from timber harvesting on soils would be localized in scale.

Lands and Realty Effects on Soils (Common to All)

Access (ROWs) – BLM manages access across public lands through ROW grants. Construction of access roads, railroads, and gravel pads in the ROW areas may adversely affect soil in the local region by increasing the amount of compacted soils in and around ROW areas.

Access (17(b) Easements) – BLM will manage ANCSA 17(b) easements that will allow limited rights for access across private native corporation lands. Construction of access roads or trails on ANCSA 17(b) easements may adversely affect soil in the local region by increasing the amount of compacted soils in and around the easement.

Management of conservation easements may have a positive effect on soils because development would be restricted on parcels of lands with conservation easements.

Disposals and Acquisitions – Disposal of BLM lands results in removal of the land from the public domain due to State entitlements, Native settlements, private or State exchanges, mining patents, Recreation and Public Purposes (R&PP) sales, and Federal Land Policy and Management Act (FLPMA) sales. The conveyance of BLM-managed lands removes them from the requirements of BLM policies that currently provide some degree of protective measures to soil resources (e.g. some management of soil-protecting vegetative cover). In contrast, land acquisition (including acquisition and management of conservation easements) could provide further protection for soil resources because these lands would be subject to BLM protective policies. In the event that BLM-managed lands are transferred or exchanged with other federal agencies (e.g. United States Fish and Wildlife Service [USFWS], United States Forest Service [USFS], or National Parks Service [NPS]) or the State of Alaska, soil resources would likely be managed under like protective measures.

Withdrawals – Withdrawals are formal actions that set aside, withhold, or reserve federal lands by administrative order or statute for public purposes. Withdrawals can withhold lands from uses, transfer lands between federal agencies, and dedicate lands for particular public use, but generally last only 20 years. Soil compaction on withdrawn lands could result from a variety of activities. Should BLM-managed lands be transferred or exchanged with other federal agencies (e.g., NPS, USFS, or USFWS) or the State of Alaska, soil resources would likely be managed under similar protective management principles.

Leasable, Locatable, and Salable Minerals Effects on Soils (Common to All)

General effects on soil resources are usually the result of gravel roads, exploratory drilling work camps, seismic tests, gravel pads, and the use of heavy equipment for extraction. These effects, which would result in the actual loss of soil in the direct area where said activities took place and compaction in adjacent areas, would likely be localized.

Effects on soil compaction from development and production activities are a result of gravel pits, pads, roads, dock and bridge construction, drilling rigs, pipelines, work camps, trucking, well heads, and reinjection wells. Assuming use of modern Alaska oil construction and operations practices, there would be relatively few long-term effects to soil resources. Modern operations have substantially decreased the footprint of drill pads, so now they only affect about two to four acres and the topsoil is removed and stockpiled. If held to “pool rules” (20 Alaska Administrative Code [AAC] 25.520), a maximum of four oil wells, or one gas well would be allowed per 640 acres. An oil spill or natural gas blowout may adversely affect soil in the immediate areas through contamination and the amount of compacted soil could increase the area affected. Post-production oil and gas remediation measures include the removal of structures, including drill pads, redistribution of the stockpiled topsoil over the disturbed area prior to reseeding, recontouring, and drainage control. The full magnitude of production effects is dependent upon the location, depth, size, and soil composition (ADNR 2005k).

CBNG is methane gas that is extracted from coal beds. Exploration for CBNG usually requires four to five wells, each requiring a gravel pad approximately one acre in size. Drilling mud and cuttings are typically disposed of on-site, because they do not generally contain hazardous materials. Upon completion of exploration, the drill rig, all debris and other waste material are removed from the site. While there has been some exploration, currently no development of

CBNG has occurred in Alaska. However, development scenarios predict an average of five to seven acres of soil resources would be affected per well. This includes construction and operation of the well site, support sites (i.e., field and sales compressor, gathering and sales lines), access roads, temporary roads, pump stations, injection facilities, utility lines and pipelines. Requirements to utilize existing road systems, where practicable, or vehicles that do not cause significant damage to soils, or their covering vegetation, would reduce some of these effects (ADNR 2005k).

Recreation Effects on Soils (Common to All)

Recreation use tends to be focused on road accessible areas surrounding large population centers. Soil compaction can lead to erosion, increased runoff, and potential flooding. Trail construction and use may lead to changes in soil compaction and erosion. Also, trails on ridgetops and steep slopes tended to have higher amounts of erosion (Leung and Marion 2000). Concentrated camping can lead to soil compaction and actual loss of topsoil. Long-term camping increases both the level of soil compaction as well as the size of the spatial footprint of effects on soil.

4.3.1.2.2 Alternative A for Soils

Lands and Realty Effects on Soils (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land acquisitions may have the potential to beneficially affect soil resources in these areas by providing further management protections through the development of specific implementation plans.

Withdrawals – ANCSA 17(d)(1) withdrawals would be maintained under Alternative A, maintaining current land use activity effects to soil resources.

Leasable, Locatable, and Salable Minerals Effects on Soils (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Coal, fluid, and hard rock mineral exploration and development activities may adversely affect soil as described under *Direct and Indirect Effects Common to All Alternatives.*

Mineral exploration and development may adversely affect soil through the compaction of soils by heavy equipment, which could increase runoff potential and downstream flooding, especially if mining activities occur within an aquifer recharge area. If any salable mineral extraction were to occur on BLM–managed lands, development would be highly localized in nature, resulting in minimal effects on soil resources.

Off-Highway Vehicles Effects on Soils (Alternative A)

Under Alternative A, there are no OHV designations in place within the Ring of Fire planning area, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). The use of OHVs is often detrimental to soil and leads to compaction and degradation. OHV use damages soils when the type and level of use exceed the capacity of the soil to resist effect. The capacity of a soil to resist effect varies depending on textural class, moisture level, and other environmental factors, but the processes by which soils are affected are generally the same. OHV use destroys soils through both the mechanical effect from surface traffic and the indirect effect from hydraulic modifications, soil transport, and deposition.

The level of effect from OHV use is a function of the natural resilience of the soil and the intensity of trail use. In a healthy situation, a natural balance is maintained between soils resilience and use. This leads to OHV use without soil damage. Although, on sites with wet, unstable, and sensitive soils, that natural equilibrium hangs precariously and is easily upset. Depending on the type of soil and its condition, even light levels of trail use can have environmental consequences. Once soils on trails have reached the degradation level that make it difficult for OHV use, riders often pioneer a new route across undisturbed landscape and the sequence begins anew. Depending on the amount of snow on the ground and depth of the frozen layer, these effects can occur in winter as well as summer (Meyer 2002). Within the Ring of Fire planning area, OHV use is concentrated in the Knik River Flats, much of which is subject to annual flooding and other natural forces that can help to minimize any long-term effects to soils. However, areas of high use in the Knik River Valley outside of the flats could see longer-term, moderate adverse effects to soil resources from compaction and degradation. OHV use on BLM–managed lands outside the Knik River Flats is relatively low, and adverse effects occurring year-round to soil resources are minimal.

Summary of Alternative A Effects on Soils

The management actions proposed under Alternative A would likely have generally minor effects on soil resources in the Ring of Fire planning area due to the relatively low level of current activity associated with mineral development. ANCSA 17(d)(1) withdrawals would be maintained. Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. All of the proposed actions would maintain the effects to soil resources at their present levels (with an expected gradual increase due to rises in populations). Currently OHV use is undesignated on BLM lands, effectively making all BLM lands within the planning area unrestricted to OHV use. Within the Knik River Valley, there may be localized areas of moderate adverse effects due to compaction and erosion.

4.3.1.2.3 Alternative B for Soils

Lands and Realty Effects on Soils (Alternative B)

Acquisitions – Under Alternative B, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land acquisitions may have the potential to beneficially affect soil resources in these areas by providing further management protections through the development of specific implementation plans.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative B, thereby opening up more lands for potential mineral exploration and development. However, as development potential is low for all minerals, adverse effects to soil resources would also be minimal.

Leasable, Locatable and Salable Minerals Effects on Soils (Alternative B)

All unselected lands (486,000 acres) and any selected lands (798,000 acres) whose selections are relinquished or revoked are open for fluid mineral leasing under this alternative. However, existing withdrawals other than ANCSA 17(d)(1), of approximately 798,000 acres, would remain withdrawn from fluid mineral leasing. ANCSA 17(d)(1) withdrawal orders will be revoked to allow locatable mineral entry subject to 43 CFR 3809 surface regulations for hard rock mining. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Adverse effects to soil resources from potential mineral development described above would be minimal, and localized in nature.

Off-Highway Vehicles Effects on Soils (Alternative B)

Under Alternative B all lands within the Ring of Fire planning area would be designated as “open” to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). BLM management actions currently do not restrict OHV use on BLM-managed lands, and it is unlikely that OHV use levels would increase over those seen considered under Alternative A. Potential long-term adverse effects on soil resources through compaction and degradation would be minimal on lands outside the Knik River Flats, and moderate on specific areas within the Knik River Flats.

Summary of Alternative B Effects on Soils

The management actions proposed under Alternative B would differ from Alternative A in that all ANCSA 17(d)(1) withdrawals would be revoked, and all lands would be designated as “open” to OHV use. Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. An increase of lands available to mineral entry could increase exploration and development activities; however, the potential for additional development is limited (Appendix G) and would be subject to ROPs and/or stipulations. Adverse effects on soil resources would be minor, and localized in nature. Effects from OHV use would be similar to those seen under Alternative A, which would be generally minor and short-term, with moderate adverse effects on soil resources seen within localized areas of the Knik River Flats.

4.3.1.2.4 Alternative C for Soils

Lands and Realty Effects on Soils (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block Special Recreation Management Area (SRMA), and the proposed Neacola Mountains Area of Critical Environmental Concern (ACEC) would both be identified as avoidance areas. Minimizing

the levels of access by development or recreational vehicles within these areas may have beneficial effects on soil resources by preventing sedimentation, rutting, and erosion.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA, the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod National Historic Trail (NHT) would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect soil resources in these areas by providing further management protections through the development of specific implementation plans.

Withdrawals – ANCSA 17(d)(1) withdrawals would be maintained under Alternative C, maintaining current land use activity effects to soil resources.

Leasable, Locatable, and Salable Minerals Effects on Soils (Alternative C)

Under Alternative C, 241,000 acres of unselected lands, and any selected lands (387,000 acres) whose selections are relinquished or revoked, are open for fluid mineral leasing. Approximately 486,000 acres of unselected lands are available for locatable and salable mineral entry. However, the following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Projected leasable mineral development would affect approximately 2,558 acres (Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations. Under Alternative C, there are also seasonal and No Surface Occupancy (NSO) constraints outlined for the Palmer Hay Flats and areas in the Cape Lieskof area of the Alaska Peninsula.

However, predicted locatable mineral development would likely affect less than 60 acres (Section 4.2.4 and Appendix G). Salable mineral development on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). In the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, soil resources should maintain their current conditions and remain protected from potential adverse effects like compaction and degradation that may occur from future mineral exploration and development. Adverse effects to soil resources from potential mineral development outside of these areas described above would be minimal, and localized in nature.

Off-Highway Vehicles Effects on Soils (Alternative C)

Lands will be designated as limited to existing roads and trails to OHV use consistent with Alaska Department of Natural Resources (ADNR) *Generally Allowed Uses on State Land*, which requires such actions as restricting use to existing trails whenever possible. The OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within the Chugach

State Park (11 AAC 20.015 and 11 AAC 20.040) would remain. Limitations on OHV use will also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. The potential adverse effects to soil from OHV use under Alternative C would likely be less than under Alternatives A or B. Limitations on OHV use in areas of current high use, such as the Knik River Flats, would show a decrease in the level of soil effects.

Recreation Effects on Soils (Alternative C)

SRMAs are designated in the Knik River and the Haines Block. An ACEC is designated in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Soil resources may receive indirect beneficial effects through the limiting of development activities.

Wild and Scenic River Effects on Soils (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs. Soil resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an impact on Outstandingly Remarkable Values (ORVs) identified for these river segments.

Summary of Alternative C Effects on Soils

The management actions proposed under Alternative C are directed towards resource conservation while continuing to allow for multiple use activities. ANCSA 17(d)(1) withdrawals would be maintained, and mineral exploration and development restrictions would be in place for specific sensitive or unique areas (Section 4.3.1.2). Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. The Knik River and Haines Block are designated as SRMAs, and the Neacola Mountains as an ACEC. Implementation plans would be developed for these areas. Under Alternative C, BLM would designate all lands as “limited” to existing roads and trails for OHV use. All of these activities would be beneficial to the soil resources located on BLM-managed lands by preventing degradation and compaction, relative to the current management actions.

The information discussed above indicates that implementation of management actions of Alternative C would result in fewer adverse effects on soil resources than under Alternatives A or B. Moreover, as a result of some management actions that would restrict land use activities in certain areas (e.g. designation of lands as SMAs), soil resources would likely benefit from implementation of Alternative C.

4.3.1.2.5 Alternative D for Soils

Lands and Realty Effects on Soils (Alternative D)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA would be identified as an avoidance area. Minimizing the levels of access by development or recreational vehicles may have beneficial effects on soil resources in this area by preventing sedimentation, rutting, and erosion.

Acquisitions – Under Alternative D, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA,

the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect soil resources in these areas by providing further management protections through the development of specific implementation plans.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative D, thereby opening up more lands for potential mineral exploration and development. However, as development potential is low for all minerals, adverse effects to soil resources would also be minimal.

Leasable, Locatable, and Salable Minerals Effects on Soils (Alternative D)

Under Alternative D, 486,000 acres of unselected lands, and any selected lands (798,000 acres) whose selections are relinquished or revoked would be open for fluid mineral leasing. Projections of leasable mineral development predict that 2,558 acres would be affected by surface disturbing activities, primarily due to predicted CBNG development occurring on split-estate land that have yet to be leased (Appendix G). Locatable mineral development projections predict less than 60 acres of surface disturbance due to a combination of land status issues and mineral potential within the Ring of Fire planning area. All mineral development would be subject to ROPs and stipulations. Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to leasable, locatable and salable mineral entry, maintaining the current conditions of soil resources in those areas.

All activities, including all mineral activities, on BLM-managed lands would be subject to ROPs and/or stipulations. Under Alternative D, there would also be seasonal and NSO constraints outlined for the Palmer Hay Flats and areas in the Cape Lieskof region of the Alaska Peninsula. However, oil and gas activities, such as road building, could still affect soils under seasonal restrictions. Coal, fluid, and hard rock mineral exploration and development activities may adversely affect soil resources as described under *Management Common to All Alternatives*. Sand and gravel mining may adversely affect soil resources as described under *Management Common to All Alternatives,* as well. However, salable mineral development on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). In the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, soil resources should maintain their current conditions and remain protected from potential adverse effects that may occur from mineral exploration and development.

Off-Highway Vehicles Effects on Soils (Alternative D)

Under Alternative D, OHV use on BLM-administered lands will be managed as described under Alternative C, including the closures at the Campbell Tract and on the BLM parcels within the Chugach State Park. Although all lands under this alternative would be designated as “limited” to existing roads and trails for OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects to soil resources relative to the current level of effects. Areas of high OHV use, such as the Knik River, may see the highest level of beneficial effects on soil resources if use is limited. Any areas that BLM chooses to open may see adverse effects to soil resources relative to current conditions.

Recreation Effects on Soils (Alternative D)

SRMAs are designated in the Knik River and the Haines Block. An ACEC is designated in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Soil resources may receive indirect beneficial effects through the limiting of OHV use or development activities.

Summary of Alternative D Effects on Soils

The management actions proposed under Alternative D are directed towards resource conservation while continuing to allow for multiple use activities. ANCSA 17(d)(1) withdrawal orders would be revoked, although restrictions would be in place for certain sensitive or unique areas. Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. The Knik River and Haines Block are designated as SRMAs, and the Neacola Mountains as an ACEC. Implementation plans would be developed for these areas. Under Alternative D, BLM would designate all lands as “limited” to OHV use. All of these activities would be beneficial to the soil resources located on BLM-managed lands, relative to the current management actions.

The information discussed above, relative to Alternative D, indicates that implementation of management actions of this alternative would result in fewer adverse effects on soil resources than under Alternatives A or B. Moreover, as a result of some management actions that would restrict land use activities in certain areas (e.g. designation of lands as SMAs), soil resources would likely benefit from implementation of Alternative D. However, this alternative would implement fewer restrictions than Alternative C, resulting in both beneficial and adverse direct and indirect effects on soil resources. ROPs and/or stipulations (Appendix D, Soils 1-12) identify measures to minimize effects on soils.

4.3.1.3 Water Resources

The potential effects to water resources under the alternatives may include changes in water quantity and drainage patterns, and degradation of water quality. The alternatives may affect surface and groundwater in isolated areas. BLM policy recognizes that many planning decisions need to consider site-specific effects that may lead to watershed-level effects. Desired ecological conditions for watersheds and water resources are described in the BLM Alaska Statewide Land Health Standards (BLM 2004u).

4.3.1.3.1 Direct and Indirect Effects Common to All Alternatives for Water Resources

Wildland Fires and Fuels Management Effects on Water Resources (Common to All)

Increased runoff from a burned area can adversely affect water quality through increased sedimentation. Flood cycles and aquatic habitat can be altered as a result of increases in water quantity from increased runoff, particularly during spring break up and storm events. Fires can also cause temporary adverse effects through increases water temperature, pH, and nutrient levels in water bodies from ash deposition (Spencer, Gabel et al. 2003).

Forestry Effects on Water Resources (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Within this plan, BLM would identify potential commercial harvest areas and high interest personal use areas. Timber harvesting has been shown to have varying degrees of adverse effects on water resources, such as increasing runoff and altering hydrologic processes (FEMAT 1993, USFS 2002a). Harvest will normally occur on no more than approximately 20 acres a year, with little road construction activity. Actions have tended to be concentrated on scattered parcels of BLM-managed lands throughout the Matanuska-Susitna Valley and the Kenai Peninsula.

It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of past timber harvests, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Given the relatively low value and limited demand for the timber in the Ring of Fire planning area, most of the timber harvested would come as an ancillary benefit from other construction projects such as ROW clearing or other permitted activities. Unless appropriately mitigated, these actions may cause sedimentation and other degradation of water quality and, especially if roads were to be built, there may be localized changes to drainage.

Hazardous Materials Effects on Water Resources (Common to All)

The management actions proposed under all alternatives for hazardous materials may have localized, beneficial effects on water quality through prevention measures and mitigation practices as sites become known.

Lands and Realty Effects on Water Resources (Common to All)

Access (ROWs) – Construction of access roads, railroads and gravel pads may have adverse effects on water quantity and drainage patterns by increasing the amount of impervious surface and decreasing the infiltration rate and capacity. However, based on the low numbers of past

ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM lands would be local in scale, and any adverse effects to water resources would not extend to the regional level.

Access (17(b) Easements – BLM will manage conservation easements and ANCSA 17(b) easements that will allow limited rights for access across private Native corporation lands. Construction of access roads or trails on ANCSA 17(b) easements may affect water resources in the local region by increasing access to public lands accessed by the easement.

Disposals and Acquisitions – Consolidating management of lands through disposals, acquisitions, and exchanges may facilitate better protection of water resources, while disposals may result in some deterioration to water.

Leasable, Locatable, and Salable Minerals Effects on Water Resources (Common to All)

Surface disturbing activities associated with mining and oil and gas activities, such as road building, resource inventories, cultural excavations, and seismic surveys, may have adverse effects to water quantity, drainage, and quality. Land clearing and grading activities necessary for construction remove vegetation and compact soils, which contributes to increased erosion and subsequent sedimentation of local surface waters. The greatest effects are likely to occur during construction, but there may be long-term effects resulting from any culverting, bridging, or road construction within a floodplain. Land-based seismic surveys are typically conducted during the winter months using truck-mounted vibrators or helicopters and snowmachines for remote operations. Seasonal timing may help minimize effects on water quality. Water quality may be degraded from small spills, improperly handled wastes and sedimentation due to eroded soils or shothole cuttings. Geophysical operations are of relatively short duration and can usually be planned and executed in a way that surface effects will be temporary. Implementation of standard policies and mitigation measures would help minimize long-term adverse effects on water resources by stabilizing soils conditions and promoting revegetation of disturbed areas.

Renewable Energy Effects on Water Resources (Common to All)

Renewable energy program sites would be evaluated on a case-by-case basis. Effects to water resources associated with renewable energy projects, such as increased levels of runoff, erosion, and sedimentation, or the diversion or redirection of waterflow from raised roadbeds, culverts, or bridges are generally smaller in magnitude and extent relative to other construction/development-related activities, and would vary for each project. Some lands have already been identified as potential energy sources within the Ring of Fire planning area; however no development activities are planned at this time (Section 3.3.9).

Off-Highway Vehicles Effects on Water Resources (Common to All)

OHVs may compact soils and adversely affect water resources in areas of high use. As soil is compacted, the structure begins to break down. Soil compaction can lead to decreased permeability and less water absorption, thereby increasing runoff potential leading to increased erosion (Sparrow, F. J. Wooding et al. 1976). OHV-generated ruts that collect and hold water can change the thermal and radiation properties of soil. Ruts and puddles can alter surface drainage, because water moving along a track causes erosion. Standing water and mud are often avoided by many OHV recreationalists, which can lead to wider and an increased number of trails. Extensive OHV use can create progressively larger ruts that further decrease soil

strength and water holding capacity (11 AAC 20.015 and 11 AAC 20.040) (Sparrow, F. J. Wooding et al. 1976; Racine and Ahlstrand 1985; Sinnott 1990). OHV use along watercourses can result in erosion, increased turbidity, and destruction of aquatic habitat (USACE 1980).

Recreation Effects on Water Resources (Common to All)

In areas of substantial recreational foot and/or vehicle traffic, potential effects on water quality can include an increase the amount of impervious surface within a watershed. Water quality may also be affected by high recreational use as these activities are generally focused around road accessible areas and generate traffic. Impervious surfaces can lead to increases in runoff potential and downstream flooding, particularly during storm events. Sensitive riparian areas, such as lakeshores and stream banks, are especially susceptible to increased tramping and soil compaction from camping, foot traffic, and vehicles. Reduced viability and rooting capacity of the riparian vegetation can in turn reduce stream bank stability and increase erosion. The effect of soil compaction is generally more severe on moist or clay-rich soils and with higher incidents of use. Discharge from two-stroke snowmachine engines can lead to pollutant deposition on snow, and wash into surface and groundwater (USFS 2002a). With the exception of the Knik River Flats, recreation activities on BLM-managed lands within the Ring of Fire planning area are relatively dispersed, and adverse effects on water quality are minimal and short-term in nature.

4.3.1.3.2 Alternative A for Water Resources

Lands and Realty Effects on Water Resources (Alternative A)

Access – Based on the low numbers of past ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM-managed lands would have effects on water resources that were local in scale, and were minimal and short-term in nature.

Withdrawals – No withdrawal review would occur under this alternative, and all existing withdrawals would stay in place. Because of the constraints in place under these withdrawals, there would be no increase in mineral resource exploration and development activities, and potential adverse effects on water quality.

Leasable, Locatable, and Salable Minerals Effects on Water Resources (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives*, however the magnitude of potential adverse effects on water quality would be minor due to the fragmented nature of BLM-managed lands within the planning area and mineral development potential.

Off-Highway Vehicles Effects on Water Resources (Alternative A)

Under Alternative A, there are no OHV designations in place within the Ring of Fire planning area, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). As currently managed, OHV use is allowed on all terrain. OHV use may cause some minor, localized adverse effects on water quantity and quality through soil compaction, increased levels of erosion and sedimentation, or the alteration of surface drainage patterns across scattered parcels throughout the planning area. Within the Ring of Fire planning area, OHV use is concentrated within the Knik River Flats, much of which is subject to flooding, high sediment loads, and other natural forces. OHV use may adversely affect water quality as a result of fuel leaks, chemical spills, and increased littering. Clear water streams that are adjacent to, or feeding into the Knik River may be moderately affected by current OHV use. OHV use on BLM-managed lands outside the Knik River Flats is relatively low, and adverse effects on water resources are minimal.

Summary of Alternative A Effects on Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands where there is existing mineral development and intensive OHV use. Forestry activity, of less than 20 acres per year, may cause sedimentation and other degradation of water quality, unless appropriately mitigated by setbacks from water bodies. Any possible effects from hazardous materials, renewable energy, and recreation would be minimal, and would likely not extend to the regional level. Mining, oil and gas, and associated road development would likely be limited in extent given the low potential for mineral development; therefore; potential adverse effects on water resources would be minor. Adverse effects may result from locatable and salable material mining, if any such mining is undertaken however, these effects would likely only occur on less than one percent of lands within the Ring of Fire planning area. As OHV use remains unrestricted, some short-term adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality may continue in heavy use areas, such as the Knik River Flats clear water streams.

4.3.1.3.3 Alternative B for Water Resources

Lands and Realty Effects on Water Resources (Alternative B)

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for disposal. Because of the constraints on surface disturbing activities such as mineral development in place under these withdrawals, there would be an increased potential for resource exploration and development. Potential adverse effects on water resources discussed under *Alternative A – Leasable, Locatable and Salable Minerals*, would be similar under this alternative.

Leasable, Locatable, and Salable Minerals Effects on Water Resources (Alternative B)

Under this alternative, some increase in localized adverse effects to water resources may occur, as additional lands are made available for mineral exploration and development. Approximately 486,000 acres of unselected lands, and any selected lands (798,000 acres) where selections

have been relinquished, would be open for mineral leasing. However the RFDs (Appendix G) for oil and gas development, predict a total of 2,558 acres of projected exploration and development. Up to 60 acres of surface disturbance is predicted through the development of locatable minerals. It is unlikely that any salable mineral extraction would occur on BLM-managed lands. All such development would be subject to ROPs and project-specific mitigation measures and, in the case of oil and gas development, stipulations. Such disturbance may result in long-term effects to water resources through impoundments and degradation of water quality through sedimentation and spills. Development on BLM-managed lands would be limited in scope, and effect a localized portion of the Ring of Fire planning area.

Off-Highway Vehicles Effects on Water Resources (Alternative B)

All lands within the Ring of Fire planning area would be designated as “open” to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Because there are currently no OHV designations on BLM-managed lands within the Ring of Fire, use occurs over all types of terrain. Therefore, the potential adverse effects under this alternative would be the same as described under Alternative A, although the management decision to allow unrestricted OHV use on all lands may increase the duration and/or magnitude of adverse effects on water resources, especially in areas of high use such as the Knik River valley clear water streams.

Summary of Alternative B Effects on Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands along the road network, areas with existing mineral development activity or higher mineral potential, and in areas of concentrated OHV use. Effects from forestry, ROWs, mining, and oil and gas would likely be limited in extent; consequently only a small portion of the waters that occur in BLM-managed lands may be affected. OHV use would be designated as open, contributing to short-term adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality in heavy use areas, such as the Knik River valley clear water streams. Overall, effects to water resources under Alternative B would mainly occur on a local scale.

4.3.1.3.4 Alternative C for Water Resources

Lands and Realty Effects on Water Resources (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Minimizing the levels of access for development or recreation vehicles would help to maintain the current condition of water resources through the prevention of road building.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect water resources in these areas by providing further management protections through the development of specific implementation plans.

Leasable, Locatable, and Salable Minerals Effects on Water Resources (Alternative C)

Under Alternative C, 241,000 acres of unselected lands, and 387,000 acres of selected lands would be open to leasable entry. However, the level of projected mineral development, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Approximately 2,558 acres of surface disturbance would occur. Locatable mineral development would occur on less than 60 acres, and salable mineral development is unlikely in BLM-managed lands. Projected mineral development would be limited in extent due to land status issues and mineral potential within the Ring of Fire planning area. All mineral development would be subject to ROPs and stipulations (Section 4.2.4 and Appendix G).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on surface water sources and recharge areas. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figured 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

All activities, including all mineral activities, on BLM-managed lands would be subject to ROPs and stipulations. Under Alternative C, there are also seasonal and NSO constraints outlined for the Palmer Hay Flats (Figure 2.3-5) and areas in the Cape Lieskof area (Figure 2.3-9) of the Alaska Peninsula. However, in the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints (e.g., NSO within 200 ft of anadromous streams and rivers), water resources should maintain their current conditions.

Off-Highway Vehicles Effects on Water Resources (Alternative C)

Lands would be designated as limited to existing roads and trails for OHV use consistent with ADNR's *Generally Allowed Uses on State Land*, which require such actions as restricting use to existing trails whenever possible. The OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040) would remain. Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to water resources relative to the current level of effects, particularly in areas of high OHV use, such as the Knik River Flats.

Recreation Effects on Water Resources (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is designated in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Water resources may indirectly benefit through potential limitations on development activities.

Wild and Scenic Rivers Effects on Water Resources (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Water resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an impact on Outstandingly Remarkable Values (ORVs) identified for these river segments.

Summary of Alternative C Effects on Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative C are likely to be limited in scale, and concentrated in specific areas. Effects on water resources from forestry (approximately 20 acres per year), establishment of ROWs, mining, and oil and gas (up to 2,618 acres total) would be minor, due to avoidance areas, low potential for mineral development, and retention of ANCSA 17(d)(1) withdrawals. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. Some management actions, such as establishment of SMAs may restrict land use activities within these specific areas, and allow for the protection and recovery of any previously affected water resources. Thus while Alternative C may result in as many, or nearly as many effects to water from development activities (fluid mineral, locatable mineral, salable mineral, and forestry) as Alternative B, limitations on OHV use in some areas could reduce effects to water resources generally (especially to Knik River tributaries).

4.3.1.3.5 Alternative D for Water Resources

Lands and Realty Effects on Water Resources (Alternative D)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4) would be identified as an avoidance area. Minimizing the levels of access by development or recreational vehicles may have beneficial effects on water resources in this area by preventing sedimentation, rutting, and erosion.

Acquisitions – Under Alternative D, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect water resources in these areas by providing further management protections through the development of specific implementation plans.

Withdrawals – No withdrawal review would occur under this alternative, and all existing withdrawals would stay in place. Because of the constraints in place under these withdrawals, there would be no increase in mineral resource exploration and development activities, and potential adverse effects on water quality.

Leasable, Locatable, and Salable Minerals Effects on Water Resources (Alternative D)

Under Alternative D, 486,000 acres of unselected lands, and 798,000 acres of selected lands would be open to leasable minerals. However, the projected level of development, and overall effects from leasable, locatable, and salable minerals would be similar to that in Alternative B. Projected mineral development would be limited in extent due to a combination of land status issues and mineral potential within the Ring of Fire planning area (Appendix G), thereby maintaining current water resource conditions throughout the Ring of Fire planning area. Similar to Alternative C, the Lake Carlanna Municipal Watershed (Figure 2.3-2) and the Halibut Cove Forest Study Area (Figure 2.3-1) would be closed to potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of water resources in those areas. All mineral development would be subject to ROPs and stipulations.

Off-Highway Vehicles Effects on Water Resources (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C, including the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects to water resources relative to the current level of effects. Areas of high OHV use, such as the Knik River SRMA, would experience beneficial effects on water resources if use is limited.

Recreation Effects on Water Resources (Alternative D)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is designated in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Water resources may indirectly benefit through establishing limits on development activities.

Summary of Alternative D Effects on Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative D are likely to be limited in scale, concentrated in specific areas, and minor in magnitude. Opening additional lands to mineral entry through revocation of ANCSA 17(d)(1) withdrawals could increase exploration activities; however the potential for additional development is low, and would be subject to ROPs and stipulations (Appendix D, Water 1-24). Potential effects from these actions would be minor. Effects from forestry (approximately 20 acres per year on BLM-managed lands), and the establishment of ROWs would likely be limited in extent; consequently only a small portion of the waters that occur in BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. The establishment of three SMAs may restrict land use activities within these specific areas, potentially benefiting water resources. Thus, while Alternative D may

result in a similar level of effects to water from development activities (fluid mineral, locatable mineral, salable mineral, and forestry) as Alternative B, limitations on OHV use in some areas could reduce effects to water generally (and especially to Knik River tributaries) and establishment of SMAs could protect and allow for recovery of previously affected water resources. The establishment of SMAs and restrictions on OHV use, leasable, locatable and salable mineral development would provide further protection and allow for recovery of previously affected water resources to a greater extent than Alternatives A or B.

4.3.1.4 Fisheries and Aquatic Habitat

4.3.1.4.1 Direct and Indirect Effects Common to All Alternatives for Fisheries and Aquatic Habitat

Wildlife Effects on Fisheries and Aquatic Habitat (Common to All)

Wildlife management under all alternatives would continue to support the efforts of the National Marine Fisheries Service (NMFS) and the USFWS to identify and designate critical habitat for all Threatened and Endangered (T&E) species across the Ring of Fire planning area. Designations of such habitat would consequently benefit fish habitat through the protections allotted from designations, which restrict certain uses of the land or water, and may therefore help protect fish habitat from alteration or contamination. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, it is dependent upon the purpose and function of the critical habitat, and the action resulting in adverse destruction or modification to that habitat (FEMAT 1993).

Lands and Realty Effects on Fisheries and Aquatic Habitat (Common to All)

Access (ROWs) – ROW grants and easements may promote the construction of paved or unpaved access roads, gravel pads, or railways, all of which may adversely affect fish habitat through runoff that may introduce contaminants into the water. However, based on the low numbers of past ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM lands would be local in scale, and any adverse effects to fish resources would not extend to the regional level.

Disposals and Acquisitions – Disposal of BLM lands results in transfer of the land to the State of Alaska, Native corporations, individuals, local governments, etc. Potential land acquisition may beneficially affect any fish resources associated with these parcels by providing management under BLM's protective policies. Should BLM-managed lands be transferred to other federal agencies (e.g., NPS, USFS, or USFWS) management, fish resources would likely be managed under similar protective measures.

Hazardous Materials Effects on Fisheries and Aquatic Habitat (Common to All)

The BLM management actions under all alternatives for hazardous materials may have localized, beneficial effects on fish habitat through prevention measures, and mitigation practices, as sites become known.

Leasable, Locatable, and Salable Minerals Effects on Fisheries and Aquatic Habitat (Common to All)

Mining and oil and gas leasing could have adverse effects on fish habitat. If roads, pads, and/or culverts were authorized through ROWs associated with development on non-BLM-managed lands, or in association with mining or oil and gas leasing, flow patterns of nearby streams and sedimentation levels through runoff could be altered. Fish may be injured by human activities, vehicular injury, exposure to contaminants, loss or degradation of habitat, or unauthorized takings. Accidental releases of petroleum hydrocarbons (oil and gas, produced water) and drilling fluids could contaminate nearby streams, thereby degrading fish habitat and possibly

causing mortality of fish, although these actions may be mitigated through permit stipulations and planning efforts.

Mining for gold and other hard rock materials has the potential to result in accidental discharges of chemical solutions (acids) and heavy metals into nearby waterways. Contamination of fish habitat can result in the mortality of fish (poisoning), as well as degradation of their habitat (through sedimentation). Disturbance of the soil surface (i.e., vegetation removal, compaction of soil) during such mining also promotes sedimentation into waterways through erosion. Placer mining for gold and other locatables has the greatest potential for effects on fish habitat.

Renewable Energy Effects on Fisheries and Aquatic Habitat (Common to All)

Renewable energy program sites would be evaluated on a case-by-case basis. Some lands have already been identified as potential energy sources within the Ring of Fire planning area; however no development activities are planned at this time (Section 3.3.9). Effects from renewable energy programs on fish habitat may include runoff due to the presence of access roads and other structures, which may carry petroleum hydrocarbons as well as sediment.

Off-Highway Vehicles Effects on Fisheries and Aquatic Habitat (Common to All)

It has been documented in Alaska that multiple stream crossings by OHVs can cause alterations of the stream bank's structure (exposed soil, denuded vegetation) and function (as rearing habitat), and may cause the introduction of sediment into the waterway (Weidmer 2002). More extensive adverse effects may occur to fish habitat located in areas of high OHV use, such as the Knik River drainage.

Recreation Effects on Fisheries and Aquatic Habitat (Common to All)

Recreation on BLM-managed lands, separate from OHV use, can affect fish habitat mainly through foot traffic on stream banks (from hiking or fishing), which can lead to erosion and sedimentation of fish habitat. When the riparian vegetation has been trampled due to overuse, or absence of defined pathways, the stream banks lose structure, which leads to erosion. Erosion adversely affects fish habitat by reducing the water quality. In general, as use levels increase in an area, recreational pollutants such as soaps, fuels, and herbicides also increase.

4.3.1.4.2 Alternative A for Fisheries and Aquatic Habitat

Lands and Realty Effects on Fisheries and Aquatic Habitat (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Easements providing access to BLM or State lands are managed by BLM. Easements provide access to lands managed by the NPS, USFS, or USFWS, and once lands are conveyed, the easement is managed by the respective agency. Any fish or fish habitat associated with these easements would likely be maintained, resulting in beneficial effects.

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. The potential for effects on fish habitat from ROW and road development is low.

Leasable, Locatable, and Salable Minerals Effects on Fisheries and Aquatic Habitat (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. However, salable mineral development on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). The development of locatable minerals (likely less than 60 acres) may cause localized adverse effects on fish habitat from projected exploration, development, and production. Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives*.

Off-Highway Vehicles Effects on Fisheries and Aquatic Habitat (Alternative A)

Under Alternative A, there are no OHV use designations within the Ring of Fire planning area, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Potential adverse effects to fish habitat from OHV use are low, except in the Knik River Flats, where effects may be moderate for specific streams that are in high use areas.

Summary of Alternative A Effects on Fisheries and Aquatic Habitat

Effects on fish habitat from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands. Areas with potential for mineral development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, making potential effects on fish and fish habitat minimal, and localized in scale. General adverse recreation effects would be localized and minimal. Acquisition of land from willing landowners, particularly when they are located along riparian areas, can have a beneficial effect on fish habitat by preventing development of private land and providing consistent habitat management. The unrestricted OHV use, especially in high-use areas such as the Knik River valley, may cause changes in stream morphology and increased levels of pollution. Overall, minimal adverse effects to fish habitat under Alternative A may occur on a local scale.

4.3.1.4.3 Alternative B for Fisheries and Aquatic Habitat

Lands and Realty Effects on Fisheries and Aquatic Habitat (Alternative B)

Acquisitions and Access – Acquisitions and access decisions that may affect fish habitat under Alternative B are the same as discussed under Alternative A and in general would be minimal.

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for leasing and disposal. Because of the constraints currently in place under these withdrawals, the revocation of the withdrawals could increase potential resource development, and potential fish habitat-disturbing activities. However, given the low development potential for minerals, effects on fish and fish habitat would be localized and minor.

Leasable, Locatable, and Salable Minerals Effects on Fisheries and Aquatic Habitat (Alternative B)

Under this alternative, approximately 486,000 acres of unselected lands and any selected lands (798,000 acres) whose selections have been revoked or relinquished would be open to leasable minerals. Localized adverse effects such as degradation of fish habitat may occur (described in *Direct and Indirect Effects Common to All Alternatives*), but, similar to Alternative A, projected mineral development would be limited in extent due to a combination of land status issues and mineral potential within the Ring of Fire planning area (Appendix G). Approximately 2,558 acres of surface disturbance would occur. Locatable mineral development would occur on less than 60 acres, and salable mineral development is unlikely on BLM-managed lands. All mineral development would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D).

Off-Highway Vehicles Effects on Fisheries and Aquatic Habitat (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as "open" to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels located within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Potential effects on fish and fish habitat would be similar to Alternative A, minor throughout most of the planning area, but moderate in specific streams within the Knik River drainage that have high levels of OHV traffic.

Summary of Alternative B Effects on Fisheries and Aquatic Habitat

Effects on fish habitat from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and would be similar to Alternative A. With the relinquishment of ANCSA 17(d)(1) withdrawals, mineral exploration could increase. However, areas with potential for mineral development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, and potential effects on fish and fish habitat would be minor. Timber harvests would continue at approximately 20 acres per year. General adverse recreation effects would be minimal and localized. Acquisitions, particularly when they occur along riparian areas, can have a beneficial effect on fish habitat by preventing development of private land and providing consistent habitat management. Designating the entire planning area as "open" to OHV use may continue to cause changes in stream morphology and increased levels of pollution in high use areas such as the Knik River drainage. Overall, minimal adverse effects to fish habitat under Alternative B may occur on a local scale.

4.3.1.4.4 Alternative C for Fisheries and Aquatic Habitat

Lands and Realty Effects on Fisheries and Aquatic Habitat (Alternative C)

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA (Figure 2.3-4), the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect fish habitat in these areas by providing further management protections through the development of specific implementation plans.

Leasable, Locatable, and Salable Minerals Effects on Fisheries and Aquatic Habitat (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. The ANCSA 17(d)(1) withdrawals would remain in place and potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on fisheries and aquatic habitats. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Under Alternative C, there are seasonal and NSO constraints outlined for the Palmer Hay Flats (Figure 2.3-5) and areas in the Cape Lieskof area (Figure 2.3-9) of the Alaska Peninsula. However, in the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, fish habitats should maintain their current conditions.

Off-Highway Vehicles Effects on Fisheries and Aquatic Habitat (Alternative C)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures at the Campbell Tract and on BLM parcels within Chugach State Park would remain. Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to fish habitat relative to the current level of effects. Subsequent planning activities for the Knik River SRMA could result in beneficial effects on fish habitat from a potential decrease in erosion and sedimentation.

Recreation Effects on Fisheries and Aquatic Habitat (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is designated in the Neacola Mountains. Fish habitat may receive indirect beneficial effects through increased management guidance and the limiting of development activities through the development of implementation plans in these areas.

Wild and Scenic Rivers Effects on Fisheries and Aquatic Habitat (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Fisheries and aquatic habitat within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Fisheries and Aquatic Habitat

Effects on fish habitat from future management under Alternative C would be similar to Alternative A, and are likely to be limited in scale, or concentrated in specific areas. Effects from forestry (approximately 20 acres per year), ROWs, and mineral disturbance due to mining and oil and gas exploration and development(up to 2,618 acres total) would likely be minor due to the avoidance areas identified under this alternative, low potential for mineral development, and retention of ANCSA 17(d)(1) withdrawals. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects on fish habitat through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection of fish habitat, resulting in a beneficial effect.

4.3.1.4.5 Alternative D for Fisheries and Aquatic Habitat

Lands and Realty Effects on Fisheries and Aquatic Habitat (Alternative D)

Acquisitions and Access – Acquisitions and access issues that may affect fish habitat under Alternative D are the same as discussed under Alternative C, except the Neacola Mountains ACEC (Figure 2.3-3) would not be identified as an avoidance area.

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for disposal. Because of the constraints in place under these withdrawals, there would be an increased potential for resource development and potential fish habitat disturbing activities.

Leasable, Locatable, and Salable Minerals Effects on Fisheries and Aquatic Habitat (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Similar to Alternative C, the Lake Carlanna Municipal Watershed (Figure 2.3-2) and the Halibut Cove Forest Study Area (Figure 2.3-1) would be closed to any potential leasable, locatable and salable mineral entry, which would maintain the current conditions of any fish or fish habitat in those areas. Any development would be subject to ROPs and stipulations (Appendix D).

Off-Highway Vehicles Effects on Fisheries and Aquatic Habitat (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040) would remain. Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects on fish habitat relative to the current level of effects. Areas of high OHV use, such as the Knik River SRMA (Figure 2.3-5), would experience beneficial effects on fish habitat, through decreases in erosion and sedimentation, if use were limited.

Recreation Effects on Fisheries and Aquatic Habitat (Alternative D)

Effects from recreation on fish habitat under Alternative D are the same as discussed under Alternative C.

Summary of Alternative D Effects on Fisheries and Aquatic Habitat

Effects on fish habitat from future management under Alternative D are likely to be limited in scale, concentrated in specific areas, and minor in magnitude. Opening additional lands to mineral entry could increase exploration activities; however the potential for additional development is low and represents less than one percent of BLM-managed lands within the planning area. Effects from forestry (approximately 20 acres per year on BLM-managed lands), ROWs, mineral development (up to 2,618 acres total) would likely be limited; consequently only small portions of BLM-managed lands may see minor effects to fish habitat. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects on fish habitat through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. The establishment of SMAs may restrict land use activities within these specific areas, potentially benefiting fish and fish habitat. ROPs and/or stipulations (Appendix D, FWH 1-14 and Water 1-24) identify measures to minimize effects on fisheries and aquatic habitat.

4.3.1.5 Wildlife

4.3.1.5.1 Direct and Indirect Effects Common to All Alternatives for Wildlife

All of the alternatives share a common objective to manage wildlife habitat to meet the goals of BLM's National Fish and Wildlife initiatives, ADF&G management plans (consistent with the Master Memorandum of Understanding [MOU] between BLM and ADF&G), federal subsistence mandates, and BLM Alaska Statewide Land Health Standards. These include:

- Ensure an abundance and diversity of habitat to support ADF&G population goals;
- Maintain, enhance, restore, and mitigate effects to big game and upland game habitat to sustain or increase populations and user opportunities;
- Perpetuate a diversity and abundance of waterfowl and wetland habitat;
- Provide suitable habitat for birds of prey; and
- Manage riparian areas to achieve a healthy and productive condition.

There are also specific management objectives for BLM sensitive species that are common to all alternatives:

- Manage habitats to maintain populations at levels that will avoid, to the extent practicable, negative effects to the species and eliminate the need to list the species as T&E by State or federal agencies.
- Inventory and monitor BLM-managed lands to determine the status and distribution of sensitive species and their habitats. Establish monitoring priorities that track population trends and habitat conditions.
- Protect, maintain, enhance, restore and mitigate effects to habitats that are critical for sensitive species, including closures and mitigation measures.
- Promote, participate in, and direct appropriate research, recovery plan implementation, and interagency cooperative monitoring efforts to adequately address conservation of sensitive species within the project area.

The majority of BLM-administered lands in the Ring of Fire planning area has been selected by Native corporations or the State and has not been subject to site-specific wildlife surveys or habitat evaluations. Most of the sensitive species that occur in these areas are closely associated with nearshore marine environments and wetland habitats (e.g., waterfowl, shorebirds, murrelets, and harbor seals), but there are some species that inhabit upland areas (e.g., songbirds and lynx). Most of the BLM lands are remote parcels that have little potential for road building, resource extraction industries, or other land-use activities that would cause wildlife habitat loss. Transportation and utility ROWs across BLM lands are typically used for OHV trails and narrow gravel roads that do not receive substantial amounts of traffic or pose challenges for wildlife to cross.

Some of the sensitive waterfowl species are subject to limited subsistence hunting by Alaska Natives. These populations are monitored by the USFWS and spring and summer migratory waterfowl harvests are managed under legislation implementing the Migratory Bird Treaty Act Amendments. BLM is not involved in decisions regarding hunting or trapping regulations and therefore has no direct role in mortality rates of game species. BLM is involved indirectly in allowing access across its lands, but these transportation requests and historical trails serve a

multitude of purposes in addition to access for hunting. The wildlife management objectives listed above include several that would decrease mortality and increase reproductive potentials of various species through habitat management and are thus considered beneficial to wildlife.

Activities on BLM administered lands that require permits are reviewed for consistency with applicable wildlife conservation laws such as the Bald Eagle Protection Act, Migratory Bird Treaty Act, Marine Mammal Protection Act, and others during the permitting process. Actions that do not require a permit or for which permits have not been pursued for some reason may or may not come to the attention of BLM staff. The extent of potential problems on many remote parcels is unknown but the policy is to be consistent with all wildlife laws during the permitting process. This policy and situation is the same for all regions in the Ring of Fire planning area and will not be discussed further.

Special Status Species

The majority of BLM-administered lands in the Ring of Fire planning area that are within, or near critical habitats for Steller sea lions and Steller's eiders, have been selected by Native corporations or the State of Alaska. However, the exact location of these various small parcels in relation to important habitat boundaries is poorly known. Most of the BLM lands along the coasts where these key habitats are located are remote parcels that have little potential for road building, resource extraction industries, or other land-use activities that could cause substantial alterations of the habitat. Under all the alternatives, areas that have nearby population centers, transportation/utility corridors, and proposed resource extraction developments are likely to receive high priority for investigations and/or coordination with other resource agencies to minimize potential effects on T&E species and their habitats.

Some special status species species are subject to subsistence hunts by Alaska Natives (e.g., Steller sea lions and Cook Inlet belugas), but the numbers killed each year are managed under the terms of the Marine Mammal Protection Act, and the Endangered Species Act (ESA), which provide exemptions for certain qualifying Alaska Native subsistence harvests. Access of subsistence hunters is generally by boats from established villages so land-use decisions by BLM are unlikely to affect access for hunters or have indirect effects on mortality. Because many marine species are susceptible to oil pollution in the water, any activities on BLM lands that have the potential for accidental release of oil or other harmful materials into the marine environment should receive careful scrutiny for prevention and mitigation measures during the permitting process under all alternatives. These measures would protect T&E species from potential mortality as well as decreased reproductive rates. Other protective measures for T&E species and their habitats would also be considered under all alternatives during the permitting process for other types of proposed activities on BLM lands such as mining and road building.

BLM is required by law and by its own policies to cooperate and coordinate with the USFWS and NMFS to develop and implement appropriate conservation measures for T&E species on BLM lands. This applies to all the alternatives and all regions of the Ring of Fire planning area. Although there may be potentially adverse activities on remote parcels that do not come to the attention of BLM staff, the policy common to all alternatives is to be consistent with the ESA during the planning and permitting processes.

Critical habitats for Steller sea lions and Steller's eiders have been established, and critical habitat for other listed species have been designated by the USFWS and NMFS. Recovery plans have been established for Steller sea lions in conjunction with NMFS and for Steller's

eiders in conjunction with USFWS. BLM has not undertaken any specific monitoring or surveys for T&E species on its lands.

The Alaska Peninsula/Aleutian Chain region includes a great amount of Steller sea lion critical habitat, and many of the Steller's eider critical habitats. In addition, if the USFWS designates any critical habitat in the future for the southwestern Distinct Population Segment (DPS) of sea otters, it would most likely be in this region. The issue of retaining federal ownership of designated critical habitat will therefore be especially important in this region. In the other three regions, the only species with designated critical habitat is Steller sea lions.

Forestry Effects on Wildlife (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads be constructed to access parcels of timber in the future, which could affect wildlife movement throughout the area.

Lands and Realty Effects on Wildlife (Common to All)

Disposals and Acquisitions – In an effort to ensure protection of special status species and critical habitat, BLM is required to develop, to the extent practicable, inventory programs that document the occurrence, distribution, population, dynamics, and habitat conditions of all listed species on lands administered by BLM, and evaluate the significance of lands administered by BLM in the conservation of those species (6840.06A1a) (BLM 2001b). Should ESA-listed species be located on unselected BLM-managed lands, the lands are required to remain in federal ownership (6840.06A4) (BLM 2001b). Should BLM-managed lands be transferred to other federal agencies (e.g., NPS, USFS, or USFWS) management, wildlife and wildlife habitat would likely be managed under similar protective measures.

Leasable, Locatable, and Salable Minerals Effects on Wildlife (Common to All)

Mining and oil and gas leasing could have adverse effects on wildlife species and important habitat. If roads were authorized through ROWs associated with development on non-BLM-managed lands, or in association with mining or oil and gas leasing, there could be localized effects to migratory patterns or habitat. Direct habitat loss may also lead to wildlife displacement and habitat fragmentation. Surface disturbing activities may displace animals into lower quality habitat and increase competition for available resources with other species uses. The greatest effects are likely to occur during construction, but there could be long-term effects resulting from any bridging or road construction that may cause permanent loss or alteration of wildlife habitat and disruption of migratory patterns.

4.3.1.5.2 Alternative A for Wildlife

Under the current management system, Alternative A, compliance, monitoring, and mitigation requirements for wildlife are determined on a case-by-case basis during the permitting process.

Lands and Realty Effects on Wildlife (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Where conservation easements are purchased or managed, development should be limited to existing improvements, which could have a status quo effect on wildlife habitat. Where 17(b) easements are transferred to the NPS, USFS, or USFWS, the condition of wildlife populations and habitat associated with these easements would likely be maintained.

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. Based on the low numbers of past ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM lands would be local in scale, and effects to wildlife species would be minor. New access routes could create new entry points for hunters into areas previously not as accessible.

Access (17(b) Easements) – BLM will manage conservation easements and ANCSA 17(b) easements that will allow limited rights for access across private native corporation lands. Construction of access roads or trails on ANCSA 17(b) easements may affect wildlife in the local region by increasing access to public lands accessed by the easement. Where 17(b) easements are transferred to the NPS, USFS, or USFWS, the condition of wildlife populations and habitat associated with these easements would likely be maintained.

Leasable, Locatable, and Salable Minerals Effects on Wildlife (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands in the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands, within the Ring of Fire planning area are available for sale of mineral materials. Projected locatable mineral development (less than 60 acres) may cause localized adverse effects on wildlife from projected exploration, development, and production. Salable mineral development on BLM-managed lands is unlikely (Appendix G). The likelihood of effects occurring to wildlife would be low given the limited potential for mineral development on BLM-managed lands.

Off-Highway Vehicles Effects on Wildlife (Alternative A)

Under Alternative A, no OHV designations are in place, or are planned for the Ring of Fire planning area, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. As currently managed, OHV use is allowed on all terrain, including through areas that could support special status species. Potential adverse effects to wildlife from OHV use would be minor, except in the Knik River Flats, where effects may be moderate for specific areas of high OHV traffic and important wildlife habitat.

Recreation Effects on Wildlife (Alternative A)

There are currently no SMAs within the Ring of Fire planning area that would affect wildlife habitat or populations. Commercial helicopter tourism activities in the Haines Block would continue to require conditions and stipulations on permits and plans of operations to minimize potential adverse effects on mountain goat populations.

Summary of Alternative A Effects on Wildlife

The management actions proposed under the various management categories of Alternative A would maintain the effects to the wildlife resources at their current levels. Areas with potential for mineral development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, and potential effects on wildlife and wildlife habitat would be minor. However, as OHV use remains unrestricted, moderate adverse effects to BLM-managed habitat, through loss of habitat and disturbance, could continue in high use areas such as the Knik River Flats. Minimal forestry activity (approximately 20 acres per year) and recreational activities along the road system may cause minor adverse effects to wildlife, but on an extremely local scale.

4.3.1.5.3 Alternative B for Wildlife

Lands and Realty Effects on Wildlife (Alternative B)

Acquisitions and Access – Acquisitions and access decisions that may affect wildlife under Alternative B are the same as discussed under Alternative A.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native Corporation would then be available for consideration of disposal. Because of the constraints currently in place under these withdrawals, rejection of the withdrawals could increase potential resource development and wildlife and habitat disturbing activities. Given the limited potential for mineral development, effects on wildlife and habitat would be localized and minor.

Leasables, Locatables, and Salables Effects on Wildlife (Alternative B)

Under this alternative, localized adverse effects to wildlife species and habitats may occur (described in *Management Common to All*). Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Off-Highway Vehicles Effects on Wildlife (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as “open”, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. Because OHV use on BLM-managed lands is currently unrestricted, this management action would have similar effects as Alternative A. Potential effects on wildlife and habitat would be minor throughout most of the planning area, but would be moderate in specific areas within the Knik River drainage.

Recreation Effects on Wildlife (Alternative B)

Under Alternative B, commercial helicopter tourism activities in the Haines Block that have potential adverse effects on mountain goats in the area would continue to require conditions and stipulations on permits and plans of operations.

Summary of Alternative B Effects on Wildlife (Alternative B)

The management actions proposed under the various management categories of Alternative B would maintain the effects to the wildlife resources at their current levels. Designating all lands as “open” to OHV use may continue adverse effects to BLM-managed habitat in high use areas such as the Knik River drainage, through loss of habitat and disturbance. Boundaries of BLM-managed lands in relation to critical habitats should receive careful scrutiny before land transfers are approved. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to wildlife, but on an extremely local scale. With the revocation of ANCSA 17(d)(1) withdrawals, mineral exploration could increase; however areas that could be disturbed through mineral development represent less than one percent (2,618 acres) of BLM-managed lands within the Ring of Fire planning area. Potential effects on wildlife and habitat would be minor. Only a small portion of the wildlife species found on BLM-managed lands could be adversely affected through loss of habitat and disturbance

4.3.1.5.4 Alternative C for Wildlife

Lands and Realty Effects on Wildlife (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Sensitive mountain goat populations within the proposed SRMA would be beneficially affected by this action.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect vegetation in these areas by providing further management protections through the development of specific implementation plans, particularly in the Haines Block SRMA where there are sensitive mountain goat populations.

Leasables, Locatables, and Salables Effects on Wildlife (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on wildlife habitats. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)

- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Under Alternative C, there are also seasonal constraints outlined for the Palmer Hay Flats (Figure 2.3-5) to protect habitat for migratory birds, and NSO areas in the Cape Lieskof area of the Alaska Peninsula (Figure 2.3-9) to protect onshore habitat of marine mammals, wintering waterfowl, northern sea otters, and crucial brown bear habitat. Actions taken in these areas, and in the areas listed above, would afford additional habitat protections to wildlife species.

Off-Highway Vehicles Effects on Wildlife (Alternative C)

Lands would be designated as "limited" to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to wildlife relative to the current level of effects. Areas of important or sensitive wildlife populations, such as the Haines Block SRMA, or high use areas such as the Knik River SRMA could result in beneficial effects on recovering wildlife populations and/or habitats due to subsequent planning activities.

Recreation Effects on Wildlife (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. The two proposed SRMAs, primarily the Haines Block, would be managed to avoid adverse effects on wildlife resources. The development of these implementation plans would help wildlife managers provide useful and effective information about wildlife habitat needs in the land-use decision-making process. This would be considered beneficial for wildlife resources in these specific areas. None of these three SMAs have designated critical habitat for T&E species.

Wild and Scenic River Effects on Wildlife (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs. Wildlife resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Wildlife

Effects to wildlife from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects on wildlife, but on an extremely local scale. Any mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres), so consequently only a small portion of the wildlife species found on BLM-managed lands could be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation or habitat. Management actions, such as the

establishment of SMAs, may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wildlife species or habitats, resulting in beneficial effects. The two SRMAs, primarily the Haines Block, would be managed to avoid adverse effects on wildlife resources.

4.3.1.5.5 Alternative D for Wildlife

Lands and Realty Effects on Wildlife (Alternative D)

Acquisitions that may affect wildlife under Alternative D are the same as discussed under Alternative C, except the Neacola Mountains ACEC would not be identified as an avoidance area.

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for disposal. Because of the constraints in place under these withdrawals, there would be an increased potential for resource development and potential wildlife population or habitat disturbing activities.

Leasable, Locatable, and Salable Minerals Effects on Wildlife (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of wildlife resources in those areas.

Off-Highway Vehicles Effects on Wildlife (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, Integrated Implementation Plans (IAP) may further modify the "limited" designation to include some open subareas for more intensive use. Limiting use within the Ring of Fire planning area may reduce adverse effects to wildlife relative to the current level of effects. Areas of high OHV use, such as the Knik River SRMA, may experience the highest level of beneficial effects on wildlife if use is limited to existing roads and trails.

Recreation Effects on Wildlife (Alternative D)

Effects from recreation on wildlife under Alternative D are the same as discussed under Alternative C and in general, due to further levels of protection, would be beneficial.

Summary of Alternative D Effects on Wildlife

Effects to wildlife from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year on BLM-managed lands) may cause adverse effects on wildlife, but on an extremely local scale and minor in magnitude. Any mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres), so consequently only a small portion of the wildlife species found on BLM-managed lands could be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Management actions, such as the establishment of SMAs, may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wildlife species or habitats, resulting in beneficial effects. The two SRMAs, primarily the Haines Block, would be managed to avoid adverse effects on wildlife resources. ROPs and/or stipulations (Appendix D, FWH 1-14) identify measures to minimize effects on wildlife.

4.3.1.6 Vegetation

4.3.1.6.1 Direct and Indirect Effects Common to All Alternatives for Vegetation

Site-specific activities would require adherence to land use management decisions, NEPA analysis, special status species review and determination of the need for pre-project surveys and/or development of mitigation measures for management of likely special status species populations and habitat.

Currently, the only T&E plant species within the BLM planning area is the Aleutian shield fern. Should additional T&E species listed under the Endangered Species Act (ESA) be found on unselected BLM-managed lands, the lands are required to remain in federal ownership (6840.06A4) (BLM 2001b). T&E species and their habitat are managed in cooperation with the USFWS.

The management policies and actions that cause direct loss of vegetation resources discussed below would also apply to the direct loss of unique habitats where special status species are more likely to occur. The likelihood of impact to special status plants or their habitats is less than that of the general vegetation community, primarily because special status plant populations are limited in size and area. When habitat that is likely to support a special status plant is within a project area, the project will be reviewed for special status plant concerns.

Wildlife Effects on Vegetation (Common to All)

Under all alternatives, critical habitat for listed species across Alaska has been designated for USFWS and NMFS managed T&E species. It is possible that critical habitat designation would provide protection for the vegetation located within the area through the restriction of development activities by way of ESA Section 7 restrictions against adverse modification or destruction of such habitat. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, it is dependent upon the purpose and function of the critical habitat, and the action resulting in adverse destruction or modification.

Wildland Fires and Fuels Management Effects on Vegetation (Common to All)

Ninety-two percent of Alaska is designated as Limited and Modified Management, meaning that naturally occurring fires are desired with some constraints. Eight percent of the remaining lands within the State of Alaska (seven million acres) are designated as Critical or Full Management where suppression and/or fuel treatments are actively employed. Although direct loss of vegetation would initially occur from wildland fires, mechanical or manual treatments, and prescribed burns, this loss would be considered relatively short-term, and generally beneficial to the regional vegetation resources over the long-term. The effects of wildland fire and fuels management would be most pronounced in the Cook Inlet Ecoregion taiga forests of southcentral Alaska (BLM 2004l).

Suppression activities that would occur under all alternatives may cause a long-term departure from the natural process, and introduce effects of fire management activities such as retardant (BLM 2004l). In the boreal forests (taiga), suppression activities increase old spruce dominated stands, reduce forest productivity and diversity, which in turn may reduce wildlife habitat quality (BLM 2005k). Continued fire management activities may allow for the establishment of invasive

plants through suppression activities. BLM would monitor vegetative communities for the cumulative effects of wildland fire, suppression actions, and the effects of excluding fire from the landscape. Effects to sensitive species would vary depending on a variety of factors, including range and distribution, life history and preferred habitats (BLM 2004l). The effects of wildland fire management and fuel management activities would be minimized through adherence to the requirements of threatened and endangered species, critical habitat, and other unique habitats. Desired ecological conditions for vegetation resources are described in the BLM Alaska Statewide Land Health Standards (BLM 2004u).

Wildland fire use, mechanical or manual treatments, and prescribed burning that may occur under all alternatives may be used to return forest stands to less hazardous, early regenerative stages; create seedbeds; enhance forage values for wildlife; maintain and improve browse quality and quantity; and rejuvenate old stands of deciduous trees. Fuels management can produce favorable conditions for conifers, or for deciduous forest, depending on prescription and initial condition. Fires in tundra transitional zones have been shown to facilitate colonization by shrubs, and increased fire use in these areas would have the effect of converting some tundra areas to shrub-dominated communities. Continued management activities may introduce invasive plants into relatively remote and undisturbed areas by fire crews, equipment aircraft, and dozers. However, BLM would attempt to hinder the introduction of invasive species by using original soil and vegetation to rehabilitate fire and dozer lines, use of native vegetation and seed when seeding or plugging is necessary, and developing rehabilitation plans by working with BLM wildlife biologists and botanists (BLM 2004l). BLM would monitor vegetative communities for the cumulative effects of wildland fire, suppression actions, and the effects of excluding fire from the landscape.

Cultural and Paleontological Resources Effects on Vegetation (Common to All)

Activities associated with cultural resource management that may affect vegetation resources include archaeological and paleontological excavations. These activities would require the removal of vegetation from the excavation site; however, it is likely that these effects would be localized and short-term. Mitigation measures would include evaluation of implementation plans and revegetation activities upon completion of such projects (BLM 1998b). Excavation crews could introduce invasive plants to remote areas, and facilitate the spread of invasive plants through the removal of native vegetation and soil disturbance activities. Mitigation measures may include rehabilitation of the site with native vegetation upon completion of the excavation project. Within the Ring of Fire planning area, there are very few archaeological and paleontological excavations; therefore effects would be localized.

Forestry Effects on Vegetation (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Given the relatively low value and limited demand for the timber in the Ring of Fire planning area, most of the timber harvested would come as an ancillary benefit from other construction projects such as ROW clearing or other permitted activities.

Forestry management actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. The spruce bark beetle has caused over 2.3 million acres of tree mortality on the Kenai Peninsula alone since 1992. As the recent warming trend continues, outbreaks of defoliating forest pests, such as the spruce budworm, coneworm, and larch sawfly, have increased. Together, these insects have affected a total of 800,000 acres of boreal forest vegetation (Parson, Carter et al. 2001). In southeast Alaska, coastal forests have suffered outbreaks from the defoliating western black-headed budworm. The effects of insects (800,000 acres) are likely to be more noticeable than minor effects resulting from timber harvests (approximately 20 acres).

Lands and Realty Effects on Vegetation (Common to All)

Disposals and Acquisitions – In an effort to ensure protection of sensitive plant species and critical habitat, BLM is required to develop, to the extent practicable, inventory programs that document the occurrence, distribution, population, dynamics, and habitat conditions of all listed species on lands administered by BLM, and evaluate the significance of lands administered by BLM in the conservation of those species (6840.06A1a) (BLM 2001b). Should ESA-listed species be located on unselected BLM-managed lands, the lands are required to remain in federal ownership (6840.06A4) (BLM 2001b). Should BLM-managed lands be transferred to other federal agencies (e.g., NPS, USFS, or USFWS) management, vegetation resources would likely be managed under similar protective measures as for vegetation resources.

Leasable, Locatable, and Salable Minerals Effects on Vegetation (Common to All)

Potential effects associated with exploration, development, and production activities are described below. However, new mineral exploration or development would be limited in extent within the Ring of Fire planning area (Appendix G).

Exploration – Effects on vegetation resources associated with exploration activities may result from seismic tests, exploratory drilling, land clearing, accidental discharges, gravel roads, work camps, and temporary gravel pads (ADNR 2005k). These effects would generally be localized and short-term. Drill pads for exploratory wells generally affect less than two acres of vegetation and access roads disturb approximately six acres per mile of the road. Seismic surveys may cause short- to long-term effects depending on the vegetation type, snow conditions, and depth of frozen ground. The effect on vegetation by seismic surveys would not be substantial if the disturbed population could be reestablished to its original State and condition, or if the population is sufficiently large or resilient enough to respond to disturbance without measurable changes.

Development and Production – Effects on vegetation resources associated with development and production activities may result from gravel pits, pads and roads, dock and bridge construction, drilling rigs, pipelines, work camps, trucking, well heads, and reinjection wells. Land clearing and grading activities necessary for construction remove vegetation and compact soils, which contributes to the establishment of invasive weeds. These effects are generally localized, but long-term relative to exploration activities. The footprint of production drill pads has decreased dramatically over the years, and now affects two to four acres. If held to “pool rules” (20 AAC 25.520), a maximum of four oil wells or one gas well would be allowed per 640 acres. Should an oil spill or natural gas blowout occur, vegetation conditions on most sites are ultimately reclaimed. An adverse effect on vegetation could result if development outpaces reclamation and reestablishment of native vegetation. If aggressive invasive non-native plants

are introduced, impacts could be long term and permanent as these species could monopolize the disturbed area and move into adjacent areas. Mitigation measures include the removal of structures used for production and rehabilitation of the disturbed areas once the field ceases to produce oil and gas (ADNR 2005K). Native species will be used for rehabilitation and permittees may be held responsible for the introduction and spread of non-native invasive species caused by their actions.

Oil production sites often include several production wells, water injectors, gas injection wells, and a waste disposal well. Produced water is generally either injected in an onsite disposal well or transported by truck or a small diameter pipe to an offsite disposal well. Other utility lines may also be necessary. Natural gas pipelines require a trench approximately three to six feet wide and four feet deep. Additional restoration efforts would be necessary to mitigate the effects of these activities. The full magnitude of production effects is dependent upon the location, depth, size, and geology (ADNR 2005k). Production and processing equipment at a typical gas well location might consist of a wellhead, a production separator, a dehydrator, and tanks. During processing, a production separator removes most of the water and liquid hydrocarbons and a dehydrator removes any remaining water in the gas. The gas then goes through a metering facility and into a sales or gathering pipeline.

Coalbed Natural Gas – Exploration for CBNG usually requires four to five wells, each requiring a gravel pad approximately one acre in size. Mud and cuttings are typically disposed of on-site, and do not generally contain hazardous materials. Upon completion of exploration, the drill rig, all debris and other waste materials are removed from the site. Currently, no development of CBNG has occurred in Alaska. However, development scenarios predict an average of five to seven acres of vegetation resources would be affected per well. This includes construction and operation of the well site, support sites (i.e., field and sales compressor, gathering and sales lines), access roads, temporary roads, pump stations, injection facilities, utility lines and pipelines. Requirements to utilize existing road systems, where practicable, or vehicles that do not cause significant damage to ground surface or vegetation would reduce some of these effects (ADNR 2005k).

Renewable Energy Effects on Vegetation (Common to All)

Under all alternatives, lands available for potential renewable energy program sites would be evaluated on a case-by-case basis. Some lands have already been identified as potential energy sources within the BLM planning area; however, no development activities are planned at this time (Section 3.3.9). Effects to vegetation associated with renewable energy programs are generally smaller in magnitude and extent relative to mineral exploration, development or production.

4.3.1.6.2 Alternative A for Vegetation

Lands and Realty Effects on Vegetation (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Where easements are transferred to the NPS, USFS, or USFWS, the condition of vegetative resources associated with these easements would likely be maintained through the use of Standard Operating Procedures, best management practices, or mitigation measures, which would also help prevent the introduction and establishment of invasive plants.

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. Effects to vegetation resources or habitats could result from the clearing and grubbing of vegetation for the corridors. However, based on the low numbers of past ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM lands would be local in scale, and any adverse effects to vegetation resources would be minimal and not extend to the regional level.

Leasable, Locatable, and Salable Minerals Effects on Vegetation (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives;* however these effects would be limited given the small number of acres designated as having high development potential on BLM-managed lands.

Off-Highway Vehicles Effects on Vegetation (Alternative A)

Under Alternative A, no OHV designations are in place or are planned for the Ring of Fire planning area, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. As currently managed, OHV use is allowed on all terrain, including sensitive habitats such as wetlands, near fish-bearing streams, and possibly through areas that support sensitive species. OHVs harm vegetation through abrading, compression, shearing, ponding and erosion, which may all degrade the ecology of an area (Sparrow, F. J. Wooding et al. 1976; USACE 1980; Sinnott 1990). In wet conditions, (e.g., spring break-up), trails may become entrenched and widen as users search for different paths. Although natural vegetation may recover over time if the trail is abandoned, the effect may permanently alter the site's thermal, soil, and hydrologic characteristics (Meyer 2004). One study conducted in the Wrangell-St. Elias National Park and Preserve of Alaska documented the average trail width to be 35 feet, equating to 4.2 acres of affect per one mile of trail (Connery 1984). Braided trail sections more than 200 feet wide have also been documented in Alaska (Meyer 2004). OHVs may also introduce invasive plants to remote environments, and facilitate their spread through disturbance of the soil and existing vegetation (Leung and Marion 2000). Adverse effects on vegetation from OHV use are generally localized and minor in scale, except for high use areas such as the Knik River drainage, where adverse effects in specific locations can be moderate.

In the Alaska Peninsula/Aleutian Islands region, OHV trails center on villages and are generally used to gain access to subsistence areas. The Buskin River Drainage receives a large amount of OHV activity in the Kodiak Region, and aerial photographs indicate that the Knik River Valley of the Southcentral region is extensively used by OHVs and other motorized vehicles, although trail networks are found throughout southcentral Alaska. Most of the BLM-managed lands in southeast Alaska are too steep for OHV use, although use has been recorded in the upper Tsirku and Takhin Rivers and the area surrounding Chilkoot Lake (Section 3.3.10).

Recreation Effects on Vegetation (Alternative A)

Under Alternative A, the Campbell Tract is the only SMA within the Ring of Fire planning area. Recreation use tends to be focused on road accessible areas surrounding large population centers. General effects to vegetation as a result of these activities include reduced plant height and vigor, loss of ground vegetation cover, invasive plant establishment, and tree trunk damage. Some vegetation types, such as alpine meadows, have much longer recovery rates from even limited degradation activities (Leung and Marion 2000). Given the generally unconsolidated nature of BLM-managed lands in the planning area, the relatively small parcel size, remote location of larger parcels, and lack of designated trails and facilities on BLM-managed lands, adverse effects from recreation activities on vegetation are localized and minor in magnitude.

Summary of Alternative A Effects on Vegetation

The current management actions under the Alternative A would maintain the effects to the vegetation resources at current levels. As OHV use continues to go unrestricted, adverse effects to BLM-managed vegetation resources through direct loss of habitat and the loss of habitat functions and values could continue and result in moderate effects in areas of high use such as the Knik River Valley. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation in localized areas. Any possible effects from renewable energy, recreation, or wildland fire and fuel management would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the vegetation found on BLM-managed lands may be affected, and effects would be minor in magnitude.

4.3.1.6.3 Alternative B for Vegetation

Lands and Realty Effects on Vegetation (Alternative B)

Acquisitions and Access – Acquisitions and access decisions that may affect vegetation under Alternative B are the same as discussed under Alternative A and would maintain effects at current levels.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative B. Previously withdrawn lands that were not selected by the State or Native Corporations would then be available for consideration of disposal. Because of the constraints currently in place under these withdrawals, relinquishment of the withdrawals could increase potential resource development and vegetation disturbing activities. Given the limited potential for mineral development, effects on vegetation would be localized and minor.

Leasables, Locatables, and Salables Effects on Vegetation (Alternative B)

Under this alternative, localized adverse effects to vegetation may occur (described in *Direct and Indirect Effects Common to All*). Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Off-Highway Vehicle Effects on Vegetation (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as "open," with the exception of the closures at Campbell Tract and BLM parcels within Chugach State Park. Because OHV use on BLM-managed lands is currently unrestricted, this management action would have similar effects as Alternative A and could result in adverse effects in localized areas.

Recreation Effects on Vegetation (Alternative B)

Under Alternative B, recreation effects to the vegetation resources would be similar to those effects described under Alternative A and would generally be minimal.

Summary of Alternative B Effects on Vegetation

The management actions proposed under the various management categories of Alternative B would result in effects on vegetation similar to Alternative A. Potential adverse effects from forestry (approximately 20 acres per year), renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. With the revocation of ANCSA 17(d)(1) withdrawals, mineral exploration could increase; however, areas with potential for disturbance from mineral development represent 2,618 acres, or less than one percent of BLM-managed lands within the Ring of Fire planning area. Consequently, only a small portion of the vegetation found on BLM-managed lands could be affected. Designating the planning area as "open" to OHV use would continue to create adverse effects to BLM-managed vegetation resources, similar to the current undesignated status, through direct loss of habitat and the loss of habitat functions and values. Adverse effects would generally be localized and minor in nature, except in high use areas such as the Knik River where moderate adverse effects to vegetation could occur due to OHV use. Introduction of invasive plants could lead to increased loss of, and permanent displacement of native vegetation. Vegetation treatments like invasive species control, forest health treatments, fuels reduction, and wildlife habitat improvements are likely to cause short-term adverse effects, and long-term beneficial effects.

4.3.1.6.4 Alternative C for Vegetation

Lands and Realty Effects on Vegetation (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Even though these areas are remote in nature, minimizing the levels of access by development or recreation vehicles would help to maintain vegetation through the prevention of road building.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect vegetation in these areas by providing further management protections through the development of specific implementation plans.

Leasables, Locatables, and Salables Effects on Vegetation (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on vegetation. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Off-Highway Vehicles Effects on Vegetation (Alternative C)

Lands would be designated as “limited” to OHV use consistent with ADNR’s *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning could result in beneficial effects to vegetation relative to the current level of effects. Areas of high OHV use, such as the Knik River, may experience the highest level of beneficial effects for recovering damaged vegetative resources.

Recreation Effects on Vegetation (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Recreational effects to vegetation resources on BLM-managed lands would likely be similar to the current levels, and reduced in the specially designated areas listed above.

Wild and Scenic Rivers Effects on Vegetation (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Vegetation within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Vegetation

Effects on vegetation from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation, unless appropriately mitigated. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the vegetation found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected vegetation resources. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative C may result in adverse effects to vegetation resources of a lesser extent and magnitude than Alternatives A, B, or D.

4.3.1.6.5 Alternative D for Vegetation

Lands and Realty Effects on Vegetation (Alternative D)

Acquisitions and Access – Acquisitions and access actions that may affect vegetation under Alternative D could be beneficial as discussed under Alternative C, except the Neacola Mountains ACEC would not be identified as an avoidance area.

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for leasing and disposal. Because of the constraints in place under these withdrawals, there would be an increased potential for resource development and potential vegetation disturbing activities.

Leasable, Locatable, and Salable Minerals Effects on Vegetation (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities,

including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of vegetation in those areas.

Off-Highway Vehicles Effects on Vegetation (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects to vegetation relative to the current level of effects. Areas of high OHV use, such as the Knik River SRMA, may experience the highest level of beneficial effects on vegetation if use is limited to existing roads and trails.

Recreation Effects on Vegetation (Alternative D)

Effects from recreation on vegetation under Alternative D would be similar to current levels as discussed under Alternative C.

Summary of Alternative D Effects on Vegetation

Under Alternative D, adverse effects to vegetation from future management are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation. Any possible effects from renewable energy, recreation, or fire would be limited to the areas where these activities occur and potential effects are not likely to extend beyond the planning area, or to the region. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (less than 2,618 acres); consequently only a small portion of the vegetation found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected vegetation resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative D may result in adverse effects to vegetation resources of a lesser extent and magnitude than the current management activities. ROPs and/or stipulations (Appendix D, Veg 1-14) identify measures to minimize effects on vegetation.

4.3.1.7 Wetlands-Riparian

4.3.1.7.1 Direct and Indirect and Indirect Effects Common to All Alternatives for Wetlands-Riparian

Direct Loss of Special Status Species

The management policies and actions that cause the direct loss of wetland and riparian resources discussed below would also apply to the direct loss of unique habitat, and sensitive, protected, and/or T&E species. However, the likelihood of such losses is substantially less than that of general wetland and riparian habitat loss, largely because sensitive populations are smaller and protective measures are in place to avoid such effects. Desired ecological conditions for wetland-riparian resources are described in the BLM Alaska Statewide Land Health Standards (BLM 2004u).

Wildland Fires and Fuels Management Effects on Wetland-Riparian (Common to All)

Wetlands and riparian areas in Alaska are generally more resistant to fire than surrounding wildlands, therefore, the effects of fire in those areas are often more limited. More extreme effects tend to occur due to suppression efforts. Large mechanized equipment and/or excessive use of smaller motorized vehicles can cause damage to wetland and riparian zones and underlying permafrost, but because riparian areas are often utilized by suppression resources as natural barriers to fire spread, heavy equipment use is usually quite limited. The use of retardant in riparian areas can have detrimental effects. The effects of wildland fire and fuels management would be most pronounced in the Cook Inlet Ecoregion taiga forests of the southcentral Alaska (BLM 2004l).

Some sensitive species would benefit from continued aggressive fire suppression activities that minimize loss of individuals, populations, or habitats. Conversely, fire suppression activities may also affect sensitive species through mortality, disturbance, displacement, damage, or alteration of key habitat components. Effects to sensitive species and their habitat would vary depending on a variety of factors, including range and distribution, life history and preferred habitats (BLM 2004l).

Cultural Resources and Paleontology Effects on Wetland-Riparian (Common to All)

Activities associated with cultural resource management that may affect wetland resources include archaeological and paleontological excavations. These activities would require the dredging of wetlands at the excavation site; however, it is likely that these effects would be localized and short-term. Mitigation measures would include evaluation of implementation plans and rehabilitation activities upon completion of such projects (BLM 1998b).

Renewable Energy Effects on Wetland-Riparian (Common to All)

Under all alternatives, lands available as potential renewable energy program sites would be evaluated on a case-by-case basis. Some lands have already been identified as potential energy sources within the BLM planning area; however, no development activities are planned at this time (Section 3.3.9). Effects to wetland resources associated with renewable energy programs are generally smaller in magnitude and extent relative to mineral exploration, development or production.

Wind, hydroelectric and solar power projects would affect wetland resources in similar ways. These effects would largely result from construction activities, such as the dredge and fill of wetlands or riparian areas for infrastructure construction, utility corridors, access roads, and transmission lines. Hydroelectric development would convert areas or riparian and wetland values to open water and relocated wetlands and riparian lands. The magnitude and extent of these effects would vary for each project (BLM 2001c; BLM 2001d; BLM 2004q). Wetlands characteristics may limit the constructability of some structures.

Leasable, Locatable, and Salable Minerals Effects on Wetlands-Riparian (Common to All)

Groundwater could be affected during construction of drill pads or by other exploration and development activities. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits, could introduce contaminants into the groundwater. Chemicals used for production drilling could cause local contamination of soils and groundwater if not managed properly. Construction of drilling pads, proper disposal practices, proper casing and cementing, and recycling of drilling fluids would be in accordance with BLM guidelines and should minimize adverse effects on groundwater quality.

Hydrologic investigations would be conducted before CBNG development to determine whether any connection existed between surface waters and the aquifer that would be dewatered. Appropriate measures would be taken to prevent adverse effects on water quality during dewatering. Dewatering during CBNG production could affect the quantity of groundwater by changing flow gradients.

4.3.1.7.2 Alternative A for Wetlands-Riparian

Lands and Realty Effects on Wetlands-Riparian (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Where conservation easements are purchased or managed, development should be limited to existing improvements, which would have a status quo effect on wetlands and riparian areas. 17(b) easements provide access to lands managed by the NPS, USFS, or USFWS, and once lands are conveyed, the easement is managed by the respective agency. The condition of wetland and riparian resources associated with these easements would likely be maintained.

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. ROWs are generally used for communication sites, utility corridors, access to mining claims, and timber resources typically remain under BLM management. Effects to wetland and riparian resources could result from the clearing and grubbing of vegetation for the corridors. However, based on the low numbers of past ROW applications within the Ring of Fire planning area, it is anticipated that any proposed road projects crossing BLM lands would be local in scale, and any adverse effects to wetland and riparian resources would not extend to the regional level.

Access (17(b) Easements) – BLM will manage conservation easements and ANCSA 17(b) easements that will allow limited rights for access across private native corporation lands. Construction of access roads or trails on ANCSA 17(b) easements may affect wildlife in the local region by increasing access to public lands accessed by the easement. Where 17(b) easements

are transferred to the NPS, USFS, or USFWS, the condition of wetlands and riparian areas associated with these easements would likely be maintained.

Leasable, Locatable, and Salable Minerals Effects on Wetland-Riparian (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). It is assumed the amount of mineral exploration and development that would occur during the planning period under this alternative would be related to the amount of acreage available for such development. The land area available for lease and mining claims would be most restrictive under this alternative; thus the potential for mineral development would likely decrease. Withdrawing areas from mineral development reduces the degree to which surface disturbance can occur, which in turn reduces adverse effects on watershed resources and water quality.

Off-Highway Vehicles Effects on Wetland-Riparian (Alternative A)

Under Alternative A, no OHV designations are in place or are planned for the Ring of Fire planning area, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. As currently managed, OHV use is allowed on all terrain, including sensitive habitats such as wetlands, near fish-bearing streams, and possibly through areas that support sensitive species. OHVs harm wetland and riparian resources through abrading, compression, shearing, and erosion, which may all degrade the ecology of an area (USACE 1980; Sinnott 1990). In wet conditions, (e.g., spring break-up), trails may become entrenched and widen as users search for different paths. Although natural vegetation may recover over time if the trail is abandoned, the effect may permanently alter the site's thermal, soil, and hydrologic characteristics (Meyer 2004). One study conducted in the Wrangell-St. Elias National Park and Preserve of Alaska documented the average trail width to be 35 feet, equating to 4.2 acres of affect per one mile of trail (Connery 1984). Braided trail sections more than 200 feet wide have also been documented in Alaska (Meyer 2004).

In the Alaska Peninsula/Aleutian Chain region, OHV trails center on villages and are generally used to gain access to subsistence areas. The Buskin River Drainage receives a large amount of OHV activity in the Kodiak Region, and aerial photographs indicate that the Knik River Valley of Southcentral region is extensively used by OHVs and other motorized vehicles, although trail networks are found throughout southcentral Alaska. Most of the BLM-managed lands in southeast Alaska are too steep for OHV use, although use has been recorded in the upper Tsirku and Takhin Rivers and the area surrounding Chilkoot Lake (Section 3.3.10).

Recreation Effects on Wetland-Riparian (Alternative A)

Current recreation activities that occur on BLM lands include sport fishing, motorized and non-motorized boating, camping, hiking, skiing, commercial recreation activities (e.g., guides and outfitters, heli-skiing, glacier tours, etc.), sightseeing, wildlife viewing, traditional recreation activities and OHV use (see above for a discussion of OHV management effects). Recreation use tends to be focused on road-accessible areas surrounding large population centers.

General effects to wetland and riparian areas as a result of these activities include reduced plant height and vigor, loss of ground vegetation cover, and tree trunk damage (Leung and Marion 2000).

Summary of Alternative A Effects on Wetlands-Riparian

The current management actions under Alternative A would maintain the effects to the wetland and riparian resources at current levels (although an increase would be expected with an increase in population). However, as BLM continues to allow OHV use and other recreational activities to go unrestricted, adverse effects to BLM-managed wetland and riparian resources through direct loss of habitat and the loss of habitat functions and values could continue. Any possible effects from renewable energy, recreation, or wildland fire and fuels management would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetlands and riparian resources found on BLM-managed lands may be affected. Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A would continue to adversely affect wetland and riparian resources in localized areas where development and managed activities are occurring.

4.3.1.7.3 Alternative B for Wetlands-Riparian

Lands and Realty Effects on Wetlands-Riparian (Alternative B)

Acquisitions and access decisions that may affect wetlands under Alternative B are the same as discussed under Alternative A. In general, wetlands would be maintained in their current condition.

Leasables, Locatables, and Salables Effects on Wetlands-Riparian (Alternative B)

Under this alternative, localized adverse effects to wetlands may occur (described in *Direct and Indirect Effects Common to All Alternatives*). Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Off-Highway Vehicles Effects on Wetlands-Riparian (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as “open,” with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. Because OHV use on BLM-managed lands is currently unrestricted, this management action would have similar effects as Alternative A on wetlands and riparian resources.

Recreation Effects on Wetlands-Riparian (Alternative B)

Under Alternative B, no SMAs would to be designated. Recreational effects to the wetland and riparian resources may increase in magnitude, extent, likelihood, and duration, as described under Alternative A.

Summary of Alternative B Effects on Wetlands-Riparian

The management actions proposed under the various management categories of Alternative B would maintain the effects to the wetland and riparian resources at levels similar to Alternative A (although an increase would be expected with an increase in population). However, as OHV use continues to go unrestricted, adverse effects to BLM-managed wetland resources through direct loss of habitat and the loss of habitat functions and values could continue. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetlands and riparian resources found on BLM-managed lands may be affected.

4.3.1.7.4 Alternative C for Wetlands-Riparian

Lands and Realty Effects on Wetlands-Riparian (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Even though these areas are remote in nature, minimizing the levels of access by development or recreation vehicles would help to maintain wetlands through the preventing of road building.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect any wetland and riparian resources in these areas by providing further management protections through the development of specific implementation plans.

Leasables, Locatables, and Salables Effects on Wetlands-Riparian (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on wetlands and riparian areas. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Off-Highway Vehicles Effects on Wetlands-Riparian (Alternative C)

Lands would be designated as "limited" to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to wetland and riparian resources relative to the current level of effects. Areas of high OHV use, such as the Knik River, may feel the highest level of beneficial effects to recovering damaged wetland and/or riparian resources.

Recreation Effects on Wetlands-Riparian (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. Recreational effects to wetland and riparian resources on BLM-managed lands would likely be similar to the current levels, and reduced in the specially designated areas listed above.

Wild and Scenic Rivers Effects on Wetlands-Riparian (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Wetland and riparian resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Wetlands-Riparian

Effects to wetland and riparian resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetland and riparian resources found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to wetlands. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wetland and riparian resources in localized areas. Available

information described in the sections above indicate that the adoption of the management actions as described under Alternative C may result in adverse effects to wetland resources of a lesser extent and magnitude than the current management activities.

4.3.1.7.5 Alternative D for Wetlands-Riparian

Lands-Realty Effects on Wetlands-Riparian (Alternative D)

Acquisitions that may affect wetlands and riparian resources would likely be maintained under Alternative D as discussed under Alternative C, except the Neacola Mountains ACEC would not be identified as an avoidance area.

Withdrawals – ANCSA 17(d)(1) withdrawal orders would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for disposal. Because of the constraints in place under these withdrawals, there would be an increased potential for resource development and potential wetland and riparian disturbing activities.

Leasable, Locatable, and Salable Minerals Effects on Wetlands-Riparian (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of wetland and riparian resources in those areas.

Off-Highway Vehicles Effects on Wetlands-Riparian (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects to wetland and riparian relative to the current level of effects. Areas of high OHV use, such as the proposed Knik River SRMA, may have the highest level of beneficial effects on wetlands if use is limited, presuming that any area that might be designated for open OHV use in this area sufficiently guards against adverse effects to wetland and riparian resources.

Recreation Effects on Wetlands-Riparian (Alternative D)

Effects from recreation on wetland and riparian resources under Alternative D are the same as discussed under Alternative C and would be similar to current levels.

Summary of Alternative D Effects on Wetlands-Riparian

Under Alternative D, effects to wetland and riparian resources from future management are likely to be limited in scale, or concentrated in specific areas. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetland and riparian resources found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to wetland and riparian resources. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wetland and riparian resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative D may result in adverse effects to wetland and riparian resources of a lesser extent and magnitude than the current management activities. ROPs and/or stipulations (Appendix D, Wetlands 1-3) identify measures to minimize effects on wetlands and riparian resources.

4.3.1.8 Visual

4.3.1.8.1 Direct and Indirect Effects Common to All Alternatives for Visual

The following sections discuss the potential direct and indirect effects of the alternatives on visual resources.

Wildlife Effects on Visual (Common to All)

Under all alternatives, critical habitat for listed species across Alaska has been designated for USFWS and NMFS T&E species. Critical habitat designation may provide additional protection for visual resources located within the area by limiting development activities by way of ESA Section 7 restrictions against adverse modification or destruction of such habitat. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, it is dependent upon the purpose and function of the critical habitat, and the action resulting in adverse destruction or modification.

Wildland Fires and Fuels Management Effects on Visual (Common to All)

Ninety-two percent of the State of Alaska is designated as Limited and Modified fire management, meaning that naturally occurring fires are desired, but do have some constraints (refer to Figures 3.3-1 through 3.3-4 for an illustration of these fire management options). Direct loss of vegetation would occur from wildland fires, mechanical or manual treatments, and prescribed burns, causing a change to the existing landscape character that could persist for years. The effects of wildland fire and fuels management may be most pronounced within the more heavily forested and populated areas of southcentral and southeast Alaska.

Forestry Effects on Visual (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Timber harvest and associated activities, including thinning, road building, and slash disposal, can drastically alter the form, line, color, and texture of the visual landscape. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula.

Lands and Realty Effects on Visual (Common to All)

Consolidating management of lands through disposals, acquisitions, and exchanges may facilitate better protection of visual resources, while disposals may result in some deterioration to visual resources.

Leasable, Locatable, and Salable Minerals Effects on Visual (Common to All)

Mining and oil and gas leasing may have adverse effects on the visual resources of an area. If roads were authorized through ROWs associated with development on non-BLM-managed lands, or other development associated with mining or oil and gas leasing, there may be

localized, but long-term effects to the form, line, color, and texture of the visual landscape. Effects to visual resources could span well beyond the actual footprint of development activities, as structures or other development can often be see from miles away. However, the terrain in much of the Ring of Fire planning area could allow development to remain shielded from most viewers, which would reduce any adverse effects of development on visual resources. Surface disturbing activities associated with the construction of facilities and pipelines, transmission lines, communication lines, and oil and gas development, would not have adverse effects on visual resources in the Ring of Fire planning area, as the areas where development would likely occur would be compatible with Visual Resource Management (VRM) Class IV objectives.

Renewable Energy Effects on Visual (Common to All)

Under all alternatives, land available as potential renewable energy program sites would be evaluated on a case-by-case basis. Some lands have already been identified as potential energy sources within the BLM planning area, however no development activities are planned at this time (Section 3.3.9). Effects to visual resources associated with renewable energy programs are generally less severe in magnitude and extent relative to other development activities.

4.3.1.8.2 Alternative A for Visual

Lands and Realty Effects on Visual (Alternative A)

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. ROWs are typically used for communication sites, utility corridors, or for access to mining claims, and timber resources usually remain under BLM management. As growth and development continues in the Ring of Fire planning area, the need for ROWs for transportation and utility corridors would increase. Potential new access routes may change the existing form, line, color, and texture of the visual landscape. However, the number of annual ROW applications for the Ring of Fire planning area is extremely low, so any effects would be minimal.

Withdrawals – No withdrawal review would occur under this alternative, and all existing withdrawals would stay in place. Because of the constraints in place under these withdrawals, mineral development would not occur on most withdrawn lands, thus helping to maintain the visual landscape.

Leasable, Locatable, and Salable Minerals Effects on Visual (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Potential effects from mineral exploration and development are discussed above under *Direct and Indirect Effects Common to All Alternatives*.

Off-Highway Vehicles Effects on Visual (Alternative A)

There are currently no OHV designations in place or planned within the Ring of Fire planning area, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. The number of OHV trails throughout Alaska and the Ring of Fire planning area increase yearly (Bane 2001). These trails fragment the natural landscape, creating varying degrees of changes to the existing visual character of the area. Braided trail sections of more than 200 feet wide have been documented in Alaska (Meyer 2004), and could occur on BLM-managed lands if trail use is not limited and seasonal restrictions are not enforced. Important viewpoints and visual resources that may have been previously inaccessible may become part of an expanding network of OHV trails, especially in areas of established high use, such as the Knik River. Within high use areas, adverse effects on visual resources could be moderate for non-motorized recreationists. In general, adverse effects to visual resources under Alternative A are localized in nature, and are likely to occur away from major road systems.

Summary of Alternative A Effects on Visual

The management actions proposed under Alternative A would have a variety of effects on visual resources occurring on BLM-managed lands. Management would maintain any effects on visual resources at their current expected levels, given that current management does not establish VRM classifications. As OHV use continues to go unrestricted, minimal adverse effects to BLM-managed visual resources may continue, primarily in areas of high use such as the Knik River. Potential mineral exploration and development, and the creation of new ROWs both have the potential to adversely affect visual resources, however any effects would likely be minimal based on the limited potential for mineral development on BLM-managed lands within the planning area (2,618 acres or less). Available information described in the sections above indicate that the adoption of the current management actions as described under Alternative A may have localized, adverse effects on visual resources.

4.3.1.8.3 Alternative B for Visual

Lands and Realty Effects on Visual (Alternative B)

Sales – Several parcels have been identified for sale under this alternative (Table 2.3-1). However, due to the small, scattered nature of these parcels, any development or alterations in the visual landscape resulting from their sale would be minimal because many of the parcels already contained structures and the expectation is that current levels of development would remain similar

Acquisitions – Under Alternative B, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Easements provide access to lands managed by BLM, State of Alaska, NPS, USFS, or USFWS, and once lands are conveyed, the easement is managed by the respective agency. The visual quality of these easements would likely be maintained.

Access (ROWs) – There are no avoidance or exclusion areas identified within the Ring of Fire planning area under this alternative. ROWs are typically used for communication sites, utility corridors, or for access to mining claims, and timber resources usually remain under BLM management. Potential new access routes may change the existing form, line, color, and texture

of the visual landscape. However, the number of annual ROW applications for the Ring of Fire planning area is extremely low, so any effects would be minimal.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under this alternative, making more lands available for consideration for leasing and disposal. Because of the constraints currently in place under these withdrawals, relinquishment could increase potential resource development and adverse effects on visual resources. However, given the low potential for mineral development, effects on visual resources would be minor. The typical terrain of the planning area would lend itself to shield construction and facilities, minimizing adverse effects to the visual landscape.

Leasable, Locatable, and Salable Minerals Effects on Visual (Alternative B)

Under this alternative, additional lands would be open to mineral entry with the revocation of ANCSA 17(d)(1) withdrawals. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D), which would include protections for visual resources. The typical terrain of the planning area would lend itself to shield construction and facilities, minimizing adverse effects to the visual landscape.

Off-Highway Vehicles Effects on Visual (Alternative B)

All lands within the Ring of Fire planning area would be designated as “open” under Alternative B, with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. Because OHV use on BLM-managed lands is currently unrestricted, this management action would have similar effects as Alternative A. Increasing OHV trail creation and widening causes changes to the existing form, line, color, and texture of the visual landscape. Important viewpoints and visual resources that may have been previously inaccessible may become part of an expanding network of OHV trails, especially in areas of established high use such as the Knik River.

Summary of Alternative B Effects on Visual

Effects on visual resources use from management proposed under Alternative B would primarily be limited to a small portion of BLM-managed lands. All lands under Alternative B would be managed as VRM Class IV, which would allow actions that make major modifications to the existing character of the landscape (Figures 2.4-1 through 2.4-4). OHV use would continue to be undesignated on all lands within the Ring of Fire planning area, and may create changes in the existing landscape character and access to visual resources. Forestry (20 acres per year), ROWs, and mineral development (2,618 acres or less) would have a minimal effect on visual resources on BLM-managed lands. Stipulations or ROPs (Appendix D, VRM 1-6) associated with mineral exploration and development may contain protections for visual resources in specific locations. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative B would have minimal effects on visual resources, and effects would be on a very localized scale, primarily in high OHV use areas such as the Knik River.

4.3.1.8.4 Alternative C for Visual

Lands and Realty Effects on Visual (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Even though these areas are remote in nature, the current visual landscape in these areas would be maintained through the prevention of road building.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect visual resources in the SMAs and Iditarod NHT by providing further management protections through the development of specific implementation plans for these areas.

Leasable, Locatable, and Salable Minerals Effects on Visual (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Several areas are identified under this alternative to remain closed to leasable, locatable and salable mineral entry (Tables 2.3-2 and 2.3-3). The typical terrain of the planning area would lend itself to shield construction and facilities, minimizing adverse effects to the visual landscape.

Off-Highway Vehicles Effects on Visual (Alternative C)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Protections for visual resources, and limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to visual resources relative to the current level of effects. Areas of high OHV use, such as the Knik River, may experience the highest level of beneficial effects towards changing the existing landscape character.

Recreation Effects on Visual (Alternative C)

Under Alternative C, SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Visual resources would receive further levels of protection through the development of implementation plans in these areas, and all resources would be managed to meet the objectives of the specific SMAs (Appendix F).

Wild and Scenic Rivers Effects on Visual (Alternative C)

Under Alternative C, BLM identified 14 river segments as eligible for WSR designation, but were not determined to be suitable for WSR designation (Table 2.3-8). Identified ORVs for these river segments would be taken into consideration when reviewing proposed actions that might have an effect on the scenic quality and existing visual landscape around the rivers.

Summary of Alternative C Effects on Visual

Effects to visual resources from management proposed under Alternative C are likely to be limited in scale, or concentrated in specific areas. The Neacola Mountains ACEC, the Halibut Cove Forest Study Area (Figure 2.4-7), and the Lake Carlanna Municipal Watershed (Figure 2.4-8) would be designated as VRM Class II. Changes in the existing landscape for these areas would be low and not attract attention. BLM-managed lands within the remainder of the planning area would be designated as VRM Class III. All lands within the Ring of Fire planning area would be designated as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the visual setting in high OHV-use areas such as the Knik River SRMA. Effects from forestry (approximately 20 acres per year), ROWs, mining, oil and gas would likely be limited in extent; consequently only a small portion of visual resources on BLM-managed lands may be affected, and those effects would be minimal. Resources would receive further levels of protection through the development of implementation plans in the three SMAs, and would be managed to meet their outlined objectives (Appendix F). Fourteen river segments were identified as eligible, but not suitable for WSR designation under Alternative C. Identified ORVs for these river segments would be taken into consideration when reviewing proposed actions that might have an effect on the scenic quality and existing visual landscape around the rivers. The majority of these actions would minimize or mitigate adverse effects on visual resources through increased protections and regulation efforts. Actions that may adversely affect the visual landscape would only occur on a small portion of BLM-managed lands.

4.3.1.8.5 Alternative D for Visual

Lands and Realty Effects on Visual (Alternative D)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4) would be identified as an avoidance area. Even though these areas are remote in nature, the current visual landscape in these areas would be maintained through the prevention of road building.

Acquisitions – Acquisitions of lands and easements would be handled the same as described under Alternative C. Land and easement acquisitions may produce a minimal beneficial effect by increasing the amount of land available for unrestricted OHV use. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. Acquisitions have the potential to beneficially affect visual resources in these areas by providing further management protections through further planning efforts.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative D. Potential effects on visual resources would be similar to Alternative B.

Leasable, Locatable, and Salable Minerals Effects on Visual (Alternative D)

Under Alternative D, effects would be the same as discussed under Alternative B. Similar to Alternative C, the Lake Carlanna Municipal Watershed (Figure 2.3-2) and the Halibut Cove Forest Study Area (Figure 2.3-1) would be closed to mineral entry. Revocation of the ANCSA 17(d)(1) withdrawals would open additional lands for mineral entry. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Any effects to visual resources occurring on those lands would occur at minor levels. The typical terrain of the planning area would lend itself to shield construction and facilities, minimizing adverse effects to the visual landscape.

Off-Highway Vehicles Effects on Visual (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three SMAs to OHV use. Because OHV use on BLM-managed lands is currently unrestricted, this management action would likely reduce OHV effects to the existing landscape character, especially in areas where implementation planning has outlined further resource protection guidelines and objectives.

Recreation Effects on Visual (Alternative D)

Management actions proposed under Alternative D are the same as those described under Alternative C. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. In areas of higher recreational use, such as the proposed Haines Block SRMA, the surrounding visual landscape plays an important part in the recreation experience. The visual landscape of the Neacola Mountains is an important component of its identification as a potential ACEC. Resources, including visual, would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F).

Summary of Alternative D Effects on Visual

Effects to visual resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas, such as the SMAs. The Lake Carlanna Municipal Watershed (Figure 2.4-9) and the Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II, where changes to the landscape character should be low, and not readily visible to the casual observer. The Neacola Mountains ACEC would be designated as VRM Class II as well. The remainder of BLM-managed lands within the planning area would be designated as VRM Class IV, which generally allows major modifications to the existing character of the landscape. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the visual landscape in high OHV-use areas, such as the Knik River SRMA. Forestry (20 acres per year), ROWs, and mineral development (2,618 acres or less) would have a minimal effect on visual resources on BLM-managed lands. Resources would receive further levels of

protection through the development of implementation plans in the three proposed SMAs, and would be managed to meet the objectives of the specific SMAs (Appendix F). The majority of these actions would have beneficial effects on visual resources through increased protections and regulation efforts. Actions that may adversely affect the visual landscape would only occur on a small portion of BLM-managed lands. ROPs and/or stipulations (Appendix D, VRM 1-6) identify measures to minimize effects on visual resources.

4.3.1.9 Paleontological Resources

4.3.1.9.1 Direct and Indirect Effects Common to All Alternatives for Paleontological Resources

Direct effects to paleontological resources are predicated on changes to the integrity of the fossil that make it distinguishable for identification. Indirect effects to paleontological resources include increased access to and close proximity of an undertaking to sensitive areas that could result in a greater vulnerability of paleontological resources to be damaged. Examples of adverse effects include destruction or partial destruction of the fossil or the site where it was discovered, or removal of the fossil from its location.

Prior to any proposed activity, identification of areawide criteria or site-specific use restrictions would be completed to ensure that: a) areas containing, or that are likely to contain, vertebrate or noteworthy occurrences of invertebrate or plant fossils are identified and evaluated prior to authorizing surface-disturbing activities; b) management recommendations would be developed to promote the scientific, educational, and recreational uses of fossils; and c) threats to paleontological resources would be identified and mitigated as appropriate. BLM would also seek appropriate partnership opportunities in using fossil resources off BLM lands to provide educational exhibits for the public when appropriate.

Forestry Effects on Paleontological Resources (Common to All)

Forest management and timber harvests may damage a variety of paleontological sites that could be effected by skidders, draglines, controlled burns, and tree felling. Timber sales would require roads for access to the timber, potentially increasing access to previously inaccessible areas and the potential for damage or looting to formerly inaccessible sites. Historically, timber harvests within the Ring of Fire planning area have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future, and adverse effects on paleontological resources would be localized and minor.

Leasable, Locatable, and Salable Minerals Effects on Paleontological Resources (Common to All)

Mining and oil and gas leasing may have adverse effects on known and undiscovered paleontological resources through vehicle traffic, use of explosives, and heavy equipment travel.

Off-Highway Vehicles Effects on Paleontological Resources (Common to All)

OHV use can disturb large areas of soil and vegetation, potentially exposing paleontological material or burials in areas where damage to the surface has already occurred (VanderHoek 2004). Areas of prolonged, high use can disturb ground surfaces, or expose paleontological resources.

Recreation Effects on Paleontological Resources (Common to All)

Recreational activities could adversely affect paleontological resources through the unintentional or intentional damage resulting from looting or vandalism.

4.3.1.9.2 Alternative A for Paleontological Resources

Leasable, Locatable, and Salable Minerals Effects on Paleontological Resources (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Effects could also be minimized on a case-by-case basis through stipulations contained within approved Plans of Operations. Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives*.

Off-Highway Vehicles Effects on Paleontological Resources (Alternative A)

Under Alternative A, there are no OHV designations in place within the Ring of Fire planning area, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). As currently managed, OHV use is allowed on all terrain, including sensitive habitats such as near fish-bearing streams (a common location for paleontological resources). OHV use can disturb large areas of soil and vegetation, potentially exposing paleontological material or fossils in areas where damage to the surface has already occurred. OHV use throughout the majority of the planning area is dispersed and on a small scale, except for areas of high use such as the Knik River Valley.

Summary of Alternative A Effects on Paleontological Resources

The management actions proposed under Alternative A would have a variety of effects on visual resources occurring on BLM-managed lands. Management would maintain any effects on visual resources at their current expected levels, given that current management does not establish VRM classifications. As OHV use continues to go unrestricted, minimal adverse effects to BLM-managed visual resources may continue, primarily in areas of high use such as the Knik River. Potential mineral exploration and development, and the creation of new ROWs both have the potential to adversely affect visual resources, however any effects would likely be minimal based on the limited potential for mineral development on BLM-managed lands within the planning area (2,618 acres or less of surface disturbance). Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A may have localized, adverse effects on visual resources.

4.3.1.9.3 Alternative B for Paleontological Resources

Lands and Realty Effects on Paleontological Resources

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would become available for consideration for leasing and disposal. Because of the constraints currently in place under these withdrawals, relinquishment of the withdrawals could increase potential resource development, and adverse effects on paleontological resources. However, given the low potential for development, effects on paleontological resources would be minor.

Leasable, Locatable, and Salable Minerals Effects on Paleontological Resources (Alternative B)

Under this alternative, localized adverse effects to paleontological resources may occur (described in *Direct and Indirect Effects Common to All Alternatives*). Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Off-Highway Vehicles Effects on Paleontological Resources (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as "open" to OHV use, except for the OHV closures, which would remain at Campbell Tract and restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). OHV use would continue across all types of terrain, including sensitive habitats such as near fish-bearing streams (a common location for paleontological resources). OHV use can disturb large areas of soil and vegetation, potentially exposing paleontological material or fossils in areas where damage to the surface has already occurred.

Summary of Alternative B Effects on Paleontological Resources

Effects to paleontological resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. Adverse effects from forestry (approximately 20 acres per year) and recreation use would likely be to small acreages and minor in scale. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, the RFDs (Appendix G) for oil and gas development, predict a total of 2,558 acres of potential disturbance. Up to 60 acres of surface disturbance is predicted through the development of locatable minerals. It is unlikely that any salable mineral extraction would occur on BLM-managed lands. All such development would be subject to ROPs, stipulations, and project-specific mitigation measures. Any adverse effects to paleontological resources from mineral development would be unlikely due to the limited potential for mineral development on BLM-managed lands within the planning area. By designated all BLM-managed lands as "open" to OHV use, adverse effects could result through damage to surface paleontological resources, especially in heavy use areas, such as the Knik River.

4.3.1.9.4 Alternative C for Paleontological Resources

Lands and Realty Effects on Paleontological Resources (Alternative C)

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA (Figure 2.3-4), the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect paleontological resources in these areas by providing further management protections through the development of specific implementation plans. Land acquisitions could result in increased accessibility and more opportunities for fossil discovery and documentation.

Leasable, Locatable, and Salable Minerals Effects on Paleontological Resources (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on paleontological resources. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Under Alternative C, there are also seasonal and NSO constraints outlined for the Palmer Hay Flats (Figure 2.3-5) and areas in the Cape Lieskof area of the Alaska Peninsula (Figure 2.3-9). However, in the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, known paleontological resources should maintain their current conditions and remain protected from future mineral exploration and development.

Off-Highway Vehicles Effects on Paleontological Resources (Alternative C)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to paleontological resources relative to the current level of effects. Areas of high OHV use, such as the Knik River, may experience the highest level of beneficial effects on paleontological resources, presuming that some occur within the proposed boundaries of the area.

Summary of Alternative C Effects on Paleontological Resources

Effects to paleontological resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. BLM would designate all lands as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E), which could reduce any adverse effects to known paleontological resources occurring in high OHV-use areas such as the Knik River SRMA. Effects from forestry (approximately 20 acres per year), ROWs, mining, and oil and gas developments (2,558 acres of oil and gas potential disturbance,

up to 60 acres of locatable potential disturbance), and recreation use would occur on a very localized scale. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Paleontological resources would receive further levels of protection through the development of implementation plans and ROPs, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F).

4.3.1.9.5 Alternative D for Paleontological Resources

Lands and Realty Effects on Paleontological Resources (Alternative D)

Acquisitions – Under Alternative D, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis to further the objectives of the SMA. In addition, the Knik River SRMA, the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect paleontological resources within the SMAs by providing further management protections through the development of specific implementation plans. Land acquisitions could result in increased accessibility and more opportunities for fossil discovery and documentation.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under this alternative. Potential effects would be similar to Alternative B.

Leasable, Locatable, and Salable Minerals Effects on Paleontological Resources (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of cultural resources in those areas.

Off-Highway Vehicles Effects on Paleontological Resources (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to existing roads and trails to OHV use, IAPs would further modify the "limited" designation by opening some subareas for more intensive OHV use. Limiting use to existing roads and trails within the Ring of Fire planning area may reduce adverse effects to paleontological resources relative to the current level of effects. Areas of high OHV use, such as the Knik River SRMA, may experience the highest level of beneficial effects on paleontological resources if use is limited, presuming that some exist within its boundaries.

Summary of Alternative D Effects on Paleontological Resources

Effects to paleontological resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, which could reduce any adverse effects on paleontological resources occurring in high OHV-use areas such as the Knik River SRMA. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, effects from forestry (potentially on 20 acres per year), ROWs, mining, and oil and gas developments (2,558 acres of oil and gas potential disturbance, up to 60 acres of locatable potential disturbance), and recreation use would occur on a very localized scale. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Paleontological resources would receive further levels of protection through the development of implementation plans and ROPs and/or stipulations (Appendix D, Cultural 1-5), if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F).

4.3.1.10 Cultural Resources

4.3.1.10.1 Direct and Indirect Effects Common to All Alternatives for Cultural Resources

An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources under current federal and State regulations (e.g., Alaska Statute [AS] 41.35.010-41.35.240; National Historic Preservation Act [NHPA]; other regulations including Archaeological Resource Protection Act [ARPA], Native American Graves Protection and Repatriation Act [NAGPRA], Abandoned Shipwrecks Act; Executive Orders [EO] 12898, 13006, 13007, and 13287) would be conducted prior to any undertaking on a case-by-case basis.

Forestry Effects on Cultural Resources (Common to All)

Forest management and timber harvests may damage a variety of archaeological sites, including tree burials, culturally modified trees, and sites on the ground that could be effected by skidders, drag lines, controlled burns, and tree felling. Timber sales would require roads for access to the timber, potentially increasing access to previously inaccessible areas and the potential for damage or looting to formerly inaccessible sites. Historically, timber harvests within the Ring of Fire planning area have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future.

Leasable, Locatable, and Salable Minerals Effects on Cultural Resources (Common to All)

Mining and oil and gas leasing, including geophysical exploration, may have adverse effects on known or undiscovered archaeological and historical sites and burials through vehicle traffic, use of explosives, and heavy equipment travel. If disturbed, these resources could lose potential information, integrity, and cultural value. Federal regulations that address archaeological and historical resources require inventory, recordation, and evaluation in the area of potential effect as part of the approval process for any surface disturbing activity. If disturbance or destruction is not avoidable, sites would be managed to ensure against adverse effects through proper mitigation. Increases in industrial development could also cause Native people to stop using an area over time, resulting in a decreased connection to place. A sense of community connection to a place is one of the criteria necessary for a traditional cultural property to be eligible for the NRHP.

Off-Highway Vehicles Effects on Cultural Resources (Common to All)

OHV use can disturb large areas of soil and vegetation, potentially exposing archaeological material or burials in areas where damage to the surface has already occurred (VanderHoek 2004). Areas of prolonged, high use can disturb ground surfaces; or expose archaeological, ethnographic, or historical sites and burials.

Recreation Effects on Cultural Resources (Common to All)

Recreational activities could adversely affect cultural resources through the unintentional or intentional damage resulting from looting or vandalism. Increased recreational activity can adversely affect ethnographic resources. For example, Native people are less likely to go to an area they have historically used if it has become an increasingly popular recreation resource,

which could result in a decreased connection to a place over time. A sense of community connection to a place is one of the criteria necessary for a traditional cultural property to be eligible for the NRHP. In some environments, areas available for camps and cabins may also have archaeological or historical remains or ethnographic significance, particularly in places with limited availability of dry, elevated ground or some particular attractive characteristics (e.g., proximity to water, shelter from prevailing winds, cave or rock shelter).

4.3.1.10.2 Alternative A for Cultural Resources

Leasable, Locatable, and Salable Minerals Effects on Cultural Resources (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Effects could also be minimized on a case-by-case basis through stipulations contained within approved Plans of Operations. Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives*.

Off-Highway Vehicles Effects on Cultural Resources (Alternative A)

Under Alternative A, there are no OHV designations in place within the Ring of Fire planning area, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). As currently managed, OHV use is allowed on all terrain, including sensitive habitats such as near fish-bearing streams (a common location for cultural resources). Continued surface damage resulting from OHV use could have adverse effects on cultural resources through the exposure or damage of these resources. Introduction of visual, atmospheric or audible elements that diminish the integrity of a property's significant features could also adversely affect the eligibility of cultural resources for inclusion on the NRHP. With the exception of high use areas such as the Knik River Valley, OHV use is generally in localized areas along the road system or in the vicinity of communities. Adverse effects on cultural resources would be localized in nature.

Summary of Alternative A Effects on Cultural Resources

Effects to cultural resources under Alternative A are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. Any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less), and the chance that any known cultural resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations. As OHV use remains unrestricted, adverse effects to cultural resources could result through damage to surface archaeological or cultural resources, especially in heavy use areas, such as the Knik River. Adverse effects from forestry and recreation use would likely be limited in extent.

4.3.1.10.3 Alternative B for Cultural Resources

Lands and Realty Effects on Cultural Resources (Alternative B)

Sales – Disposals of lands identified could result in a culturally significant place no longer being accessible, even though the parcels identified are relatively small within the overall planning area (Table 2.3-1).

Acquisitions – Acquisitions would be considered from willing landowners on a case-by-case basis. Land acquisitions could result in increased accessibility for the community for whom the place is culturally significant.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative B. Previously withdrawn lands that were not selected by the State or Native corporations would become available for consideration for leasing and disposal. Because of constraints currently in place under these withdrawals, revocation could increase potential resource development and adverse effects on cultural resources. However, given the low potential for mineral development, effects on cultural resources would be minor.

Leasable, Locatable, and Salable Minerals Effects on Cultural Resources (Alternative B)

Under this alternative, localized adverse effects to cultural resources may occur (described in *Direct and Indirect Effects Common to All Alternatives*). Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Off-Highway Vehicles Effects on Cultural Resources (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be designated as “open” to OHV use, except for restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Adverse effects to cultural resources would be similar to Alternative A. OHV use would continue across all types of terrain, including sensitive habitats such as near fish-bearing streams (a common location for cultural resources). Continued surface damage resulting from OHV use could have adverse effects on cultural resources through the exposure or damage of these resources.

Visual

All BLM-managed lands would be designated as VRM Class IV, allowing major modifications to the existing character of the landscape, and the context of cultural resource sites. Potential effects would be mitigated by requirements for cultural resource surveys prior to development activities, and compliance with ROPs and stipulations.

Summary of Alternative B Effects on Cultural Resources

Effects to cultural resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road

network. However, an inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. Adverse effects from forestry and recreation use would likely be limited in extent. The disposal or acquisition of lands may adversely or beneficially affect culturally important places. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, any mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less), so the chance that any known cultural resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations, ROPs and stipulations. As OHV use remains unrestricted, adverse effects to cultural resources could result through damage to surface archaeological or cultural resources, especially in heavy use areas, such as the Knik River.

4.3.1.10.4 Alternative C for Cultural Resources

Lands and Realty Effects on Cultural Resources (Alternative C)

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA (Figure 2.3-4), the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect cultural resources in these areas by providing further management protections through the development of specific implementation plans. Acquiring lands could also result in increased accessibility for a community for whom the place is culturally significant.

Leasable, Locatable, and Salable Minerals Effects on Cultural Resources (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Any actions that limit the extent of surface disturbing activities would help minimize adverse effects on cultural resources. The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Under Alternative C, there are also seasonal and NSO constraints outlined for the Palmer Hay Flats (Figure 2.3-5) and areas in the Cape Lieskof area (Figure 2.3-9) of the Alaska Peninsula. However, in the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, cultural resources should maintain their current conditions and remain protected from future mineral exploration and development.

Off-Highway Vehicles Effects on Cultural Resources (Alternative C)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use to existing roads and trails within the Ring of Fire planning area may reduce adverse effects to cultural resources relative to the current level of effects. Areas of high OHV use, such as the Knik River, may experience the highest level of beneficial effects on cultural resources, presuming that some cultural resources occur within the proposed boundaries of the area.

Visual Effects on Cultural Resources (Alternative C)

The Neacola Mountains ACEC, the Halibut Cove Forest Study Area (Figure 2.4-5), and the Lake Carlanna Municipal Watershed (Figure 2.4-6) would be managed as VRM Class II. All other lands would be managed as VRM Class III (Figures 2.4-5 through 2.4-8). These class designations may beneficially affect the visual integrity of properties eligible for the NRHP.

Wild and Scenic Rivers Effects on Cultural Resources (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Cultural resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Cultural Resources

Effects to cultural resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. BLM would designate all lands

as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which could reduce any adverse effects to cultural resources occurring in high OHV-use areas such as the Knik River SRMA. Effects from forestry, ROWs, mining, and oil and gas developments, and recreation use would occur on a very localized scale, and would be subject to ROPs and stipulations. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Cultural resources would receive further levels of protection through the development of implementation plans, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Visual class designations would be made on all BLM-managed lands, a few of which would be managed under VRM Class II, maintaining the existing visual character around potential cultural resources in these areas.

4.3.1.10.5 Alternative D on Cultural Resources

Lands and Realty Effects on Cultural Resources (Alternative D)

Acquisitions – Under Alternative D, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. In addition, the Knik River SRMA, the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. Land acquisitions may have the potential to beneficially affect cultural resources in these areas by providing further management protections through the development of specific implementation plans. Acquiring lands could also result in increased accessibility for a community for whom the place is culturally significant.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under Alternative D. Potential effects on cultural resources would be similar to Alternative B and would be minor.

Leasable, Locatable, and Salable Minerals Effects on Cultural Resources (Alternative D)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D). Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of cultural resources in those areas.

Off-Highway Vehicles Effects on Cultural Resources (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Although all lands under this alternative would be designated as “limited” to OHV use, IAPs would further modify the "limited" designation by opening some subareas for more intensive OHV use. Limiting use within the Ring of Fire planning area may reduce adverse effects to cultural resources relative to the current level of effects. Areas of high OHV use, such as the

Knik River SRMA, may experience the highest level of beneficial effects on cultural resources if use is limited, presuming that there are cultural resources within its boundaries.

Visual Effects on Cultural Resources (Alternative D)

The Lake Carlanna Municipal Watershed (Figure 2.4-9), and the Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II. These class designations may beneficially affect the visual integrity of properties eligible for the NRHP. All other lands would be managed as VRM Class IV, which would allow modifications to the visual landscape that could dominate the view (Figure 2.4-7 through 2.4-9), and potentially adversely affect the character of cultural resource sites. Potential effects would be mitigated by requirements for cultural resource surveys prior to development activities, and compliance with ROPs and stipulations.

Summary of Alternative D Effects on Cultural Resources

Effects to cultural resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. BLM would designate all lands as “limited” to OHV use, which could reduce any adverse effects to cultural resources occurring in high OHV-use areas such as the Knik River SRMA. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, effects from forestry, ROWs, mining, and oil and gas development, and recreation use would occur on a very localized scale. Exploration and development activities would be subject to ROPs and/or stipulations (Appendix D, Cultural 1-5). SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Cultural resources would receive further levels of protection through the development of implementation plans, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Visual class designations would be made on all BLM-managed lands, a few of which would be managed under VRM Class II, maintaining the existing visual character around potential cultural resources in these areas.

4.3.2 Resource Uses

4.3.2.1 Resources with Effects Common to All Alternatives

4.3.2.1.1 Forestry

Some minimal forestry activity occurs generally within the Ring of Fire planning area each year. Historically, timber harvests have not exceeded 100,000 board feet annually, representing a disturbance of approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula.

Given the high percentage of lands selected by the State of Alaska and Native corporations, limited forest resources on BLM-owned lands, the relatively unconsolidated nature and small parcel size of BLM-managed lands, and the remote location of larger parcels, potential commercial harvest areas and high interest personal use areas have not been identified. Timber harvests on BLM-managed lands in the planning area are primarily salvage operations associated with other development activities. All forestry management practices would be conducted consistent with guidelines described in the ROPs (Appendix D). BLM will identify potential commercial harvest areas and high interest personal use areas. If any of these areas are identified within the SRMAs and ACEC, management will be consistent with the objectives of the SRMAs and ACEC (Appendix F).

4.3.2.1.2 Grazing

There are no authorized livestock or reindeer grazing operations or permits in the BLM Ring of Fire planning area, although unauthorized use may occur. There is currently limited demand for livestock forage and grazing privileges on BLM-administered land. Some inquiries have been made regarding short-term grazing by recreational and commercial interests in pursuit of hunting, fishing, and backcountry recreation that utilize saddle, pack, or draft animals. However, there has been no demand for commercial livestock or reindeer grazing operations in the last decade.

Livestock, reindeer, or saddle or pack animal grazing use would occur by permit only. Requests would be carefully considered, and grazing would not be permitted where it is incompatible with sensitive wildlife populations, habitats, and vegetation; or in areas of high erosion and slope instability. Grazing would be managed and permitted in a manner compatible with adjacent and federal landowners.

4.3.2.1.3 Renewable Energy

Potential renewable energy resources in the Ring of Fire planning area include wind, geothermal, hydroelectric, and solar power. While no management actions proposed in this plan are meant to exclude the use of sites for hydropower generation, there are no existing or proposed renewable energy program sites on BLM-managed lands in the planning area. Alaska is not included in an ongoing study to increase solar and wind energy systems on BLM land in other states (BLM 2005d). A hydroelectric power site could be reserved along the Chatachakna River in the future, however it is not proposed in this PRMP/FEIS.

No management actions specific to renewable energy were identified for the BLM Ring of Fire planning area. If areas were to be identified in the future, and fell within the boundaries of the SRMAs and ACEC, management will be consistent with the objectives of these areas (Appendix F).

4.3.2.2 Lands and Realty

4.3.2.2.1 Direct and Indirect Effects Common to All Alternatives for Lands and Realty

Wetlands-Riparian Effects on Lands and Realty (Common to All)

Management of wetlands and riparian areas could result in setbacks and other potential restrictions on lands and realty actions. Potential restrictions could include designation of limited development areas within leases, and rerouting of proposed ROWs or road easements.

Wildland Fire and Fuels Management Effects on Lands and Realty (Common to All)

Fire management under all alternatives would generally help protect land use authorizations by reducing fire loads and suppressing larger fires. In situations where fire is used to manipulate vegetative composition, or is otherwise used in fire management, there is a possibility that the fire could become wild and cause damage to above ground facilities and structures associated with land use authorizations. However, the unconsolidated nature and relatively small parcel size of BLM lands in the Ring of Fire planning area make the likelihood of such potential effects minimal.

Visual Resources Effects on Lands and Realty (Common to All)

VRM would effect land use authorizations such as ROWs, leases, and permits. Facilities, structures and linear features such as roads would need to meet the objectives for the particular VRM class in which the project was proposed, which could entail mitigation, relocation, or elimination of certain facilities resulting in additional time and costs in project development.

Cultural Resources Effects on Lands and Realty (Common to All)

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. Lands and realty actions must avoid inadvertent damage to federal and non-federal cultural resources through compliance with Section 106 of the NHPA. Cultural resource inventories would need to be completed prior to federal lands and realty actions, and effects to important cultural resource sites would need to be avoided. Actions taken to avoid effects to important cultural sites could include rerouting a proposed ROW or road easement, or restructuring or abandoning a proposed land adjustment such as a land exchange or sale. The magnitude of potential effects would be site specific, but would not likely effect large areas of BLM managed lands, due to the location, scattered nature and relative small size of parcels in the planning area.

Paleontological Resources Effects on Lands and Realty (Common to All)

The effects on lands and realty from the management of paleontological resources would be very similar to those of cultural resources as described in the previous paragraph.

Forestry Effects on Lands and Realty (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road

construction activity. It is expected that a similar volume of harvest will occur in the foreseeable future. While no major road construction has occurred as a result of timber harvests, it is not inconceivable that short spur, or temporary roads could be constructed to access parcels of timber in the future. Activities associated with forestry could require leases for timber harvest and ancillary activities, and road construction could require short-term land authorizations for roads ROWs.

Given the relatively low value and limited demand for the timber in the Ring of Fire planning area, most of the timber harvested would come as an ancillary benefit from other construction projects such as ROW clearing or other permitted activities. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. Potential lands and realty effects would generally be beneficial but minor, given the small scale of historic timber operations.

Lands and Realty (Common to All)

Disposals – Lands disposed of or exchanged under the R&PP Act and FLPMA would continue to be considered on a case-by-case basis. An analysis of whether disposal of lands would be in the national interest and that lands and would be better suited for ownership by another public or private entity would be conducted, along with an analysis associated with compliance with NEPA. Community interest in disposal of BLM lands under the R&PP process is likely to remain at current levels or increase after the adjudication of selected lands. Selected lands are ineligible for disposal without relinquishment by the selectee, and exchanges will be considered only after State and Native selections have been settled.

Withdrawals – Withdrawals, not including ANSCA 17(d)(1), are to be evaluated on a case-by-case at the request of the holding agency. If withdrawals remain valid, those parcels will continue to be withheld from other authorizations (BLM 2005q). However, some withdrawal orders would be revoked, when requested by the holding agency, at which time the parcel would be available to consider easements, leases, and permits/licenses for authorized actions. If a withdrawal order were revoked, other land authorizations would be considered by BLM. Effects to land authorizations from withdrawal evaluation would vary depending on which withdrawals are approved for conveyance, revoked, or relinquished, and which land authorizations will be allowed.

Access (ROWs and easements) – BLM will continue to manage conservation easements, as well as 17(b) easements that access public lands across Native lands. An effort will be made to transfer 17(b) easements that access NPS, USFS, and USFWS lands to the appropriate agency for management. There is no expected decrease in access currently provided by 17(b) easements. Road and utility easements associated with specific proposed activities will be considered on a case-by-case basis.

Hazardous Material Effects on Lands and Realty (Common to All)

Land Use authorizations for uses that would involve disposal of materials that could contaminate the land would not be issued, while projects involving storage of hazardous materials would be managed to limit possibility of contamination. Lands proposed for acquisition would need to be inventoried for the presence of hazardous materials. The presence of contaminants could lead to actions such as the modification or abandonment of an ownership adjustment proposal, or remediation in the form of clean-up and removal of the contaminants.

Leases, permits, and easements would include measures to prevent contamination through the application of ROPs and stipulations.

Leasable, Locatable, and Salable Minerals Effects on Lands and Realty (Common to All)

The management of leasable, locatable, and salable minerals would likely result in requests for land use authorizations such as ROWs and permits.

4.3.2.2.2 Alternative A for Lands and Realty

Leasable, Locatable, and Salable Minerals Effects on Lands and Realty (Alternative A)

Leasable Minerals – No BLM-managed lands are identified as open to fluid mineral leasing, except where existing use is already occurring. These closures would render any fluid leasables present as unrecoverable and other land authorizations could be considered for these lands. However, in cases where oil and gas is being extracted or may be extracted from BLM-managed lands by adjacent development activities, BLM may lease such lands, and any leases issued to address extraction would be subject to standard lease terms and ROPs. The Authorized Officer may add additional stipulations to the lease that are developed through further NEPA analysis, and as developed through consultation with other regulatory agencies.

Coal exploration and non-energy leasable mineral prospecting is currently authorized on unleased lands managed and wholly owned by BLM, and would be allowed on a case-by-case basis. Coal production and non-energy leasable mineral prospecting permits could result in permits for ROW and potential easements. However, the *Mineral Potential Report* (Appendix G) has indicated that RFD for minerals is relatively limited in extent, estimated at 2,558 acres, and potential effects on lands and realty would be minimal.

Locatable Minerals – Approximately 60 acres are currently open for locatable mineral entry. Development of locatable minerals would require Approved Plans of Operations, which would contain stipulations based on site-specific resource values and concerns. Some ANCSA 17(d)(1) lands that are currently closed to mineral entry and other uses would remain closed. Effects on lands and realty would be minimal.

Salable Minerals – Of the approximately 1.3 million acres of BLM managed lands within the Ring of Fire planning area, approximately 486,000 acres of unselected lands are available for sale of mineral resources. Within the Ring of Fire planning area, the majority of salable materials come from private lands in the Aleutian Chain and Southcentral regions. Additional demand for sand and gravel would be limited to localized areas. Development of salable minerals would require Approved Plans of Operations, which would contain stipulations based on site-specific resource values and concerns.

Off-Highway Vehicles Effects on Lands and Realty (Alternative A)

While there are no OHV designations within the Ring of Fire planning area, the current management situation allows OHV use on all BLM-managed lands, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). With regard to BLM managed lands in the planning area, OHV use is concentrated along the Knik River, and to a lesser extent in the Haines Block. Both of these areas have a significant amount of selected lands. Land authorizations such as easements, ROWs, natural resource exploration and development would not be effected by

OHV use. However, there are adverse effects on adjacent land uses, which are discussed under the OHV analysis.

Recreation Effects on Lands and Realty (Alternative A)

There are currently no SMAs within the Ring of Fire planning area that would affect lands and realty actions. Commercial helicopter tourism activities in the Haines Block would continue to require conditions and stipulations on permits and plans of operations.

Summary of Alternative A Effects on Lands and Realty

Under Alternative A, lands and realty authorizations would continue to occur on a case-by-case basis; no lands would be specifically identified for sale. The continuation of ANCSA 17(d)(1) withdrawals would have a moderate adverse cumulative effect on availability of public land for mineral use, although the potential for reasonably foreseeable mineral development is limited (2,618 acres or less). Access for OHV would remain undesignated for BLM managed lands, and activities within the Knik River area would contribute to adverse effects on habitat, adjacent land use, and public safety.

4.3.2.2.3 Alternative B for Lands and Realty

Visual Resources Effects on Lands and Realty (Alternative B)

Under Alternative B, all lands within the Ring of Fire planning area would be managed under VRM Class IV, which is the least restrictive classification. VRM classes will be considered in developing permit conditions for lands and realty authorizations, and activities could be subject to permit conditions that maintain VRM Class IV values, which allow major modifications to the landscape, and would have minimal effects on lands and realty actions.

Leasable, Locatable, and Salable Minerals Effects on Lands and Realty (Alternative B)

As ANCSA 17(d)(1) withdrawal orders are lifted, land open to potential mineral leasing would increase and some additional land use authorizations associated with increased resource exploration would be anticipated. However, the *Mineral Potential Report* has indicated that RFD for minerals is relatively small, primarily on existing mining claims, and that the likelihood of additional development is low (Appendix G).

Leasable Minerals – Of the approximately 1.3 million acres of BLM managed lands within the Ring of Fire planning area, approximately 486,000 acres of unselected lands would be open for fluid mineral leasing. Selected lands, where selections have been relinquished and revoked would also be open to fluid mineral leasing. Stipulations and required operating procedures described in Appendix D would apply to all lands open to oil and gas leasing. Due to the relatively small number of acres designated as having high mineral development potential on BLM-managed lands, effects on lands and realty actions would be minimal.

The potential effects related to other leasable minerals would be similar to Alternative A, with the exception of additional lands being made available to leasing from the rejection of ANCSA 17(d)(1) withdrawals. Coal exploration would continue to be authorized, on a case-by-case basis, however, coal exploration activities in open areas and non-energy leasable mineral prospecting in open areas, will be subject to BLM's stipulations and ROPs.

Locatable Minerals – By revoking ANCSA 17(d)(1) withdrawals, approximately 486,000 acres of unselected lands would be available for locatable mineral resource exploration. Lands and realty actions associated with easements, ROWs, and associated permits would increase. However, the *Mineral Potential Report* has indicated that RFD for minerals is relatively small, estimated at 60 acres, primarily on existing mining claims. Development of locatable minerals would require Approved Plans of Operations, which would contain stipulations and required operating procedures described in Appendix D.

Salable Minerals – The effects of salable minerals would be the same as discussed for Alternative A, with the addition that Approved Plans of Operations would contain stipulations and ROPs described in Appendix D.

Off-Highway Vehicles Effects on Lands and Realty (Alternative B)

Alternative B would designate all BLM-managed land in the Ring of Fire planning area open to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Effects would be the same as for Alternative A.

Recreation Effects on Lands and Realty (Alternative B)

No new SMAs would be designated under Alternative B. Effects would be the same as for Alternative A under which conditions and stipulations under permits are required.

Summary of Alternative B Effects on Lands and Realty

Under Alternative B, eight specific small parcels would be offered for sale (Table 2.3-1), and the revocation of ANCSA 17(d)(1) withdrawals could result in an increase in lands and realty authorizations. However, the potential for mineral development is considered low (2,618 acres or less).

All BLM managed lands in the planning area would be designated as open to OHV access, which is effectively similar to Alternative A. All lands within the Ring of Fire planning area would be managed under VRM Class IV, which is the least restrictive classification. No new SMAs would be designated.

4.3.2.2.4 Alternative C for Lands and Realty

Wildlife Effects on Lands and Realty (Alternative C)

Wildlife values would be further addressed in the development of special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC.

Visual Resources Effects on Lands and Realty (Alternative C)

Under Alternative C, the Neacola ACEC, Halibut Cove Forest Study Area (Figure 2.4-5), and the Lake Carlanna Municipal Watershed (Figure 2.4-5) would be managed as VRM Class II, and the Knik River SRMA would be managed as VRM Class IV (Figure 2.4-5). All other BLM lands with the planning area would be managed as VRM Class III. Maintenance of minimum VRM Class I or II could result in restrictions on permits, leases, ROWs and other lands and realty action. Depending on the location and proposed action, adverse effects would be minimal to moderate.

Leasable, Locatable, and Salable Minerals Effects on Lands and Realty (Alternative C)

Leasable Minerals – As ANCSA 17(d)(1) withdrawals would be maintained, the amount of unselected lands open to fluid and solid mineral leasing would be reduced compared to Alternative B. In addition, four specific areas on unselected lands and four areas on selected lands would be closed to fluid mineral leasing (see Table 2.3-2). In order to protect important wildlife habitat, NSO would be required on BLM managed lands within ¼ mile inland from the mean high tide in the Cape Lieskof area of the Alaska Peninsula (Figure 2.3-9). Similarly, no oil and gas exploration activity or road building would be allowed during two periods important to migratory birds in the Palmer Hay Flats (Figure 2.3-5). Provisions for leasing under situations of drainage would still apply, along with the application of ROPs and stipulations described in Appendix D. Potential effects on lands and realty actions would be similar to but less than Alternative B.

Locatable and Salable Minerals – With regard to locatable and salable minerals, less than 60 acres of locatable mineral development is expected, and salable mineral development is unlikely. The four areas listed in Table 2.3-3 would be closed to mineral entry, and ROPs and stipulations would be applied as described in Appendix D to approved Plans of Operation. Potential effects on lands and realty actions would be similar to, but less than Alternative B.

Off-Highway Vehicles Effects on Lands and Realty (Alternative C)

Alternative C would designate all BLM-managed land in the Ring of Fire planning area as limited to existing and designated trails, consistent with State regulations on generally allowed uses on State land. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Within the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA (Figure 2.3-4), and the proposed Mountains ACEC (Figure 2.3-3), limitations would be further refined to meet the objectives of the SRMAs and ACEC (Appendix F). Refinement would likely increase compatibility with adjacent land use and land use plans, resulting in moderate beneficial effects. Other lands and realty actions would not be affected.

Recreation Effects on Lands and Realty (Alternative C)

Special management designations are given to the Knik River (SRMA), Haines Block (SRMA), and Neacola Mountains (ACEC), and management objectives are described in Appendix F. Management for recreation values would decrease the amount of development authorizations that would be allowed for those areas, but could reserve certain values for other land uses.

Wild and Scenic Rivers Effects on Lands and Realty (Alternative C)

Under Alternative C, segments of 14 rivers were identified as eligible, but not suitable, for WSR designation. To the extent that some of these river segments are located within the Knik River and Haines Block would be identified as SRMAs for recreation, and the Neacola Mountains as an ACEC, the ORVs for which these river segments have been designated would be addressed during the preparation of special management plans. Identified ORVs for river segments outside of identified SMAs would be taken into consideration when reviewing proposed actions that might have an effect on the ORV. Addressing these values through conditions and stipulations on lands and realty actions may restrict some land authorizations; effects would be localized.

Summary of Alternative C Effects on Lands and Realty

Under Alternative C, no lands would be identified for sale within the planning area, and effects would be similar to Alternative A. Emphasis would be placed on acquisition of land from willing landowners within the Knik River SRMA, the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT. ANCSA 17(d)(1) withdrawals would remain under Alternative C; until conveyance of selected land is settled, the amount of unselected lands open to fluid and solid mineral leasing would be reduced compared to Alternative B. In addition, four specific areas on unselected lands and four areas on selected lands would be closed to fluid mineral leasing (Table 2.3-2).

All BLM-managed land in the Ring of Fire planning area would be limited for OHV access to existing and designated trails, consistent with State regulations on *Generally Allowed Uses on State Lands* (Appendix E). Within the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC, limitations would be further refined to meet the objectives of the SMAs (Appendix F). The Neacola ACEC, Halibut Cove Forest Study Area and Lake Carlanna Municipal Watershed would be managed as VRM Class II, and the Knik River SRMA as VRM Class IV. All other BLM lands with the planning area would be managed as VRM Class III. Wildlife values would be further addressed in the development of special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC.

4.3.2.2.5 Alternative D for Lands and Realty

Wildlife Effects on Lands and Realty (Alternative D)

Effects would be the same as discussed under Alternative C.

Visual Resources Effects on Lands and Realty (Alternative D)

Under Alternative D, the Lake Carlanna Municipal Watershed (Figure 2.4-9) and Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II. This is a relatively restrictive class, and appropriate stipulations and conditions would be placed on lands and realty actions. The Neacola Mountains ACEC would be managed as VRM Class II, with appropriate stipulations and conditions placed on lands and realty actions. The rest of the planning area would be managed as VRM Class IV. Effects to lands and realty authorizations would generally be localized and minor.

Leasable, Locatable, and Salable Minerals Effects on Lands and Realty (Alternative D)

Leasable Minerals – Effects on leasable minerals would be similar to Alternative B, with the recommendation to revoke of ANCSA 17(d)(1) withdrawals. For fluid minerals, two areas would remain closed to entry (Lake Carlanna Municipal Watershed and Halibut Cove Forest Study Area). Similar to Alternative B, stipulations and ROPs listed in Appendix D would apply. Similar to Alternative C, measures to protect wildlife habitat such as NSOs and seasonal closures would apply to specific areas on the Alaska Peninsula and the Palmer Hay Flats. Potential effects on lands and realty actions would be localized, and in the case of Palmer Hay Flats, short term in nature (seasonal closure), and would therefore be minor.

As with Alternative B, coal exploration would continue to be authorized, on a case-by-case basis; however, coal exploration activities in open areas and non-energy leasable mineral prospecting in open areas, will be subject to the ROPs presented in Appendix D.

Locatable and Salable Minerals – By recommending the revocation of ANCSA 17(d)(1) withdrawals, locatable and salable minerals exploration and development, easements, ROWs, and associated permits would have the potential to increase. Activities would be subject to the stipulations and ROPs presented in Appendix D. However, the Lake Carlanna Municipal Watershed and Halibut Cove Forest Study Area would remain closed to mineral entry. Given the relatively low potential for mineral development, effects on lands and realty actions would be minor.

Off-Highway Vehicles Effects on Lands and Realty (Alternative D)

All lands in the Ring of Fire planning area would be designated as limited to existing roads and trails to OHV use, with additional direction to be developed under special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Effects would be minor, similar to Alternative B.

Recreation Effects on Lands and Realty (Alternative D)

The effects would be the same as discussed under Alternative C.

Summary of Alternative D Effects on Lands and Realty

A total of eight small parcels have been identified for sale in the planning area, totalling approximately eight acres (Table 2.3-1). Revocation of ANCSA 17(d)(1) withdrawals could result in an increase in lands and realty authorizations, although specific areas would remain closed to mineral entry. However, the potential for mineral development is considered low (2,618 acres or less). The Mountain Goat Monitoring and Control Area within the Haines Block SRMA would be identified as an avoidance area for issuance of ROW authorizations. All lands in the Ring of Fire planning area would be designated as limited to existing roads and trails to OHV use, with additional direction to be developed under implementation plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC. The Lake Carlanna Municipal Watershed and Halibut Cove Forest Study Area would be managed as VRM Class II, the Neacola Mountains ACEC would be managed as VRM Class II, and the rest of the planning area would be managed as VRM Class IV. Wildlife values would be further addressed in the development of special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC.

4.3.2.3 Leasable Minerals

Under certain alternatives, leasable minerals such as oil and gas, CBNG, coal, and geothermal resources would be made available for development over the next 10 to 15 years, subject to BLM lease stipulations and ROPs (Appendix D), unless withdrawal or other administrative action is justified. The following sections describe the effects of these activities on the resource itself. Effects on other resources from these activities are described in the appropriate resource sections.

4.3.2.3.1 Direct and Indirect Effects Common to All Alternatives for Leasable Minerals

The management alternatives include restrictions on fluid mineral resource development as a result of conflicts with environmentally related surface values, which can result in effects to the use of the resources while providing additional protection of the environment. These restrictions effect development by increasing the costs of development activities. Where incremental costs result in a reduced return on investment below an acceptable level, the leaseholder may choose not to proceed with the development. This would result in a reduced production of oil and gas, lower royalty and tax payments, and decreased spending with contractors and vendors, such as drilling and service companies. Mitigations could result in non-environmental effects on the resource users, including decreased profit and reduced interest in developing other economically marginal resources within the Ring of Fire planning area.

The RFD for leasable minerals indicates high development potential for oil and gas, and moderate development potential for CBNG, which is limited to the Cook Inlet Oil and Gas Basin. These fluid minerals are considered to have low development potential in other regions of the Ring of Fire planning area due to inaccessibility, lack of infrastructure, and past exploration history. Because no foreseeable actions are anticipated for these resources in the Alaska Peninsula/Aleutian Chain, Kodiak, and Southeast regions, there would be no effect on the environment in these regions under any of the alternatives. The following discussion of direct and indirect effects pertains to the Southcentral region only.

4.3.2.3.2 Alternative A for Leasable Minerals

BLM-managed lands currently closed to leasing would remain closed under this alternative, with the exception of lands being drained of oil and gas from adjacent development, in which case BLM may lease such lands. Under current circumstances, no federal oil and gas, including CBNG would be extracted except from the existing federal leases in established oil and gas fields.

Under Alternative A, ANCSA 17(d)(1) withdrawals would be retained, and would remain closed to certain types of mineral entry. Areas where energy and mineral development are prohibited because of non-discretionary closures could contain resources that cannot be developed regardless of the market for the commodity or interest in development. No associated income or related economic activity could be realized from these resources, and the lost opportunity for development represents an unknown effect to the resource users. However, mineral potential as identified in Appendix G is relatively limited.

Summary of Alternative A Effects on Leasable Minerals

Under this alternative, leasable mineral development is unlikely because no lands are identified as open. The only potential for development would be in the event of drainage.

4.3.2.3.3 Alternative B for Leasable Minerals

Lands and Realty Effects on Leasable Minerals (Alternative B)

Under Alternative B, BLM would recommend revocation of ANCSA 17(d)(1) withdrawals and allow mineral leasing on these lands retained in federal ownership. All unselected lands (486,000 acres) and any selected lands whose selection is revoked would be open for fluid mineral leasing.

New oil and gas, and CBNG development under Alternative B, as well as continued oil and gas production at existing fields with federal leases, would result in reduction of total fluid mineral reserves, since it is a non-renewable resource. Implementation of ROPs and stipulations (Appendix D) could result in some additional restrictions on exploration and development of leasable minerals.

Visual Effects on Leasable Minerals (Alternative B)

Under this alternative, all lands within the Ring of Fire planning area would be managed as VRM Class IV. This level of management provides for actions that would make major modifications to the existing character of the landscape. These restrictions are expected to have negligible effects on leasable mineral development and exploration.

Summary of Alternative B Effects on Leasable Minerals

Under this alternative, ANCSA 17(d)(1) withdrawals would be recommended for revocation, and some additional lands would be open to mineral exploration. However, the potential for mineral development is limited given the small number of acres designated as having high development potential on BLM-managed lands (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. VRM Class IV management would be prescribed for all lands, and would have minimal adverse effects to development practices.

4.3.2.3.4 Alternative C for Leasable Minerals

Lands and Realty Effects on Leasable Minerals (Alternative C)

Under Alternative C, ANCSA 17(d)(1) withdrawals would be retained, and withdrawn from mineral leasing. Over 241,000 acres of unselected lands and 387,000 acres whose selection may be relinquished or revoked are open for fluid mineral leasing. Effects from reduction of leasable mineral reserves, existing field operations and potential geophysical exploration under Alternative C, would be less than described for Alternative B.

Visual Effects on Leasable Minerals (Alternative C)

Changes to the characteristic landscape should be very low, and not attract attention. The Neacola Mountains ACEC (Figure 2.3-3), and the Halibut Cove Forest Study Area (Figure 2.3-1) (both in the Southcentral region) would be managed as VRM Class II. All other lands would be managed as VRM Class III (Figure 2.4-5). There are currently no VRM Classes established within the Ring of Fire planning area. VRM Class I and II management would result in some restrictions on development activities, including minerals. Any ROPs, stipulations, or permit conditions for mineral exploration and development in these identified areas would be more restrictive than current conditions (Appendix D).

Wild and Scenic Rivers Effects on Leasable Minerals (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Leasable mineral potential within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Leasable Minerals

Under this alternative, mineral development is unlikely due to the lack of high development potential areas on BLM unencumbered lands (Appendix G), as well as fewer acreages available for leasing from discretionary closures. ANCSA 17(d)(1) withdrawals would be retained, and some small areas would be closed to mineral development (Table 2.3-2). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. Designation of the Haines Block, Knik River, and Neacola Mountains SMAs could result in additional restrictions on mineral development within those areas. VRM Classes would be recommended for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas, thus making development all the less likely.

4.3.2.3.5 Alternative D for Leasable Minerals

Lands and Realty Effects on Leasable Minerals (Alternative D)

Fluid mineral leasing under Alternative D would be similar to Alternative B; ANCSA 17(d)(1) withdrawals would be revoked. All unselected lands (486,000 acres) and any selected lands (798,000 acres) whose selection is relinquished or revoked would be open for fluid mineral

leasing. Of specific sensitive lands closed to mineral leasing under Alternative D, none are located within Cook Inlet Basin – an area designated as having high development potential for oil and gas, and moderate development potential for CBNG. Thus, effects from leasable mineral activities under Alternative D would be the same as those described for Alternative B.

Visual Effects on Leasable Minerals (Alternative D)

The Halibut Cove Forest Study Area would be managed as VRM Class II within the Southcentral region. The proposed Neacola Mountains ACEC would be managed as VRM Class II. All other lands would be managed as VRM Class IV (Figure 2.4-8). There are currently no VRM Classes established within the Ring of Fire planning area. Any ROPs, stipulations, or permit conditions for mineral exploration and development in these identified areas would be more restrictive than current conditions (Appendix D).

Summary for Alternative D on Leasable Minerals

Under this alternative, ANCSA 17(d)(1) withdrawals would be revoked, and some additional lands would be open to mineral exploration. However, mineral development is unlikely due to low mineral development potential (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. Designation of the Haines Block, Knik River, and Neacola Mountains SMAs could result in additional restrictions on mineral development within those areas. VRM Classes would be designated for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

4.3.2.4 Locatable and Salable Minerals

Locatable Minerals

While locatable minerals occur throughout most areas of the Ring of Fire planning area, only certain types of minerals and certain regions within the Ring of Fire are expected to have exploration and/or development potential the next 10 to 15 years. Exploration and development of locatable minerals is anticipated to occur in the Alaska Peninsula, southcentral Alaska, and southeast Alaska regions as described in the RFD developed by BLM (2005o) for locatable minerals (attached to Appendix G, Mineral Potential Report). The RFD predicts activity based on mineral deposit models, past and present exploration interest, and accessibility. While locatable minerals may be present in other areas (Aleutian Chain, Kodiak), they are considered uneconomic to explore and develop due to inaccessibility, deposit size, and projected industry interest. Thus, no foreseeable actions are anticipated for locatable minerals in the Aleutian Chain or Kodiak regions for the next 10 to 15 years.

Salable Minerals

The *Mineral Potential Report* and RFD address four types of salable minerals with a history of exploration and/or development in the Ring of Fire planning area: aggregate (sand and gravel), building stone, clay, and pumice. The effects analysis assumes that the demand for gravel will increase over the next 10 to 15 years as road maintenance and construction continue on State highways, State lands, Native corporation lands, and private lands. Little or no foreseeable development potential is predicted for clay and pumice, due to lack of markets and great distances to markets for these materials (BLM 2005o).

4.3.2.4.1 Direct and Indirect Effects Common to All Alternatives for Locatable and Salable Minerals

The RFD for locatable minerals indicates exploration and/or development potential in three regions of the Ring of Fire planning area: Alaska Peninsula, Southcentral, and Southeast. These minerals are considered to have low potential in the Aleutian Chain and Kodiak regions due to inaccessibility, mineral deposit size or type, and economic viability. Because no foreseeable actions are anticipated for these resources in the Aleutian Chain or Kodiak regions, there would be no effect on the environment under any of the alternatives.

Alaska Peninsula/Aleutian Chain Region

Five mineral deposit sites were identified in the RFD (Appendix G) on BLM-managed lands within the Alaska Peninsula that could be explored over the next 10 to 15 years. Mine development on one of these sites could occur in approximately 15 years (BLM 2005o).

Southcentral Region

Continued operations at an existing mine in the Girdwood area are anticipated to reduce the total remaining locatable mineral reserves in the region.

Southeast Region

A number of placer and lode deposits could be explored on BLM-managed lands in the Southeast region over the next 10 to 15 years. Of the existing inactive placer operations

currently located on BLM-managed lands, only one, located in the Porcupine area near Klukwan, is projected to have any activity during this timeframe.

4.3.2.4.2 Alternative A for Locatable and Salable Minerals

Lands and Realty Effects on Locatable and Salable Minerals (Alternative A)

Under Alternative A, most BLM-managed lands are currently closed to locatable mineral entry because of ANCSA 17(d)(1) withdrawals or State- or Native-selections, and would remain closed for the next 10 to 15 years. Thus, the total projected surface disturbance under Alternative A would be far less than that described in the RFD. As described below, current locatable mineral activity that would continue under Alternative A is located only in the Southcentral and Southeast regions.

BLM-administered surface and split-estate lands are currently available for exploration and development of salable minerals, and would continue to be available throughout the next 10 to 15 years under Alternative A. There are currently no known salable mineral activities on BLM-managed lands within the Ring of Fire planning area; however, because the demand for aggregate for road construction and maintenance is expected to increase over the next 10 to 15 years due to RFFAs (Section 4.4.2), there may be future interest in BLM-managed lands located near certain areas of potential high aggregate occurrence as described below.

One existing mine on BLM-managed land in the Southcentral region, located in the Girdwood area, is projected to operate under Alternative A, and would slightly reduce the total locatable mineral reserves in the region under Alternative A.

A number of inactive placer operations and lode prospects are currently located on State- or Native-selected lands or split-estate lands (State land with federal subsurface estate) in the Southeast region. Of these, only one of the placer mines, located in the Porcupine area near Klukwan, has had any active mining in the recent past and is likely to continue under Alternative A. If so, these activities would slightly reduce the total locatable mineral reserves in the region under Alternative A.

Summary of Alternative A Effects on Locatable and Salable Minerals

Existing locatable mineral activities that would continue under Alternative A would slightly reduce overall locatable mineral reserves. ANCSA 17(d)(1) withdrawals would remain in place, and most BLM-managed lands would remain closed to locatable mineral entry.

4.3.2.4.3 Alternative B for Locatable and Salable Minerals

Lands and Realty Effects on Locatable and Salable Minerals (Alternative B)

Under Alternative B, BLM would recommend revocation of all ANCSA 17(d)(1) withdrawals to allow locatable mineral leasing on lands retained in federal ownership, subject to 43 CFR 3809 regulations and BLM Alaska's stipulations and ROPs (Appendix D).

BLM-administered surface and split-estate lands are currently available for exploration and development of salable minerals, and would continue to be available throughout the next 10 to 15 years under Alternative B. The effects of salable activities within each region would be the same as those described under Alternative A.

Visual Effects on Locatable and Salable Minerals (Alternative B)

Under this alternative, all lands within the Ring of Fire planning area would be managed as VRM Class IV (Figure 2.4-1 through 2.4-3). This level of management provides for actions that would make major modifications to the existing character of the landscape. Change to the characteristic landscape can be high, and can dominate the view, becoming the major focus of the viewer. Stipulations and ROPs outlined to protect visual resources under this alternative would not be as stringent as under other alternatives.

Summary of Alternative B Effects on Locatable and Salable Minerals

Locatable mineral activities would reduce overall locatable mineral reserves in the Ring of Fire planning area, although the amount of mineral development is projected to continue at relatively low current levels. Salable mineral effects under Alternative B would be the same as Alternative A. VRM Class IV management would be prescribed for all lands, and would have minimal adverse effects on development practices.

4.3.2.4.4 Alternative C for Locatable and Salable Minerals

Lands and Realty Effects on Locatable and Salable Minerals (Alternative C)

Under Alternative C, ANCSA 17(d)(1) withdrawals would be retained, and current locatable mineral activity and reclamation on existing sites would continue as described under Alternative A. Existing locatable mineral activities that would continue under Alternative C would slightly reduce overall locatable mineral reserves.

There would be no effect on salable mineral activities, and no reduction in salable mineral reserves from these activities.

Visual Effects on Locatable and Salable Minerals (Alternative C)

Changes to the characteristic landscape should be very low, and not attract attention. The Neacola Mountains ACEC, the Halibut Cove Forest Study Area (Figure 2.4-5), and the Lake Carlanna Municipal Watershed (Figure 2.4-6) would be managed as VRM Class II. All other lands would be managed as VRM Class III. There are currently no VRM Classes established within the Ring of Fire planning area. Any ROPs, stipulations, or permit conditions for mineral exploration and development in these identified areas would be more restrictive than current conditions (Appendix D).

Wild and Scenic Rivers Effects on Locatable and Salable Minerals (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)

- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Locatable and salable mineral potential within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Locatable and Salable Minerals

Under this alternative, mineral development is unlikely due to land status and mineral potential (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). VRM Classes would be recommended for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

4.3.2.4.5 Alternative D for Locatable and Salable Minerals

Lands and Realty Effects on Locatable and Salable Minerals (Alternative D)

Under Alternative D, ANCSA 17(d)(1) withdrawals would be recommended for revocation. Locatable mineral activities under Alternative D would reduce overall locatable mineral reserves in the Ring of Fire planning area.

Salable minerals effects under Alternative D would be the same as Alternative A.

Visual Effects on Locatable and Salable Minerals (Alternative D)

The Lake Carlanna Municipal Watershed (Figure 2.4-9), and the Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II. The Neacola Mountains ACEC would be managed as VRM Class II (Figure 2.4-10). All other lands would be managed as VRM Class IV (Figures 2.4-7 through 2.4-9). There are currently no VRM Classes established within the Ring of Fire planning area. Any ROPs, stipulations, or permit conditions for mineral exploration and development in these identified areas would be more restrictive than current conditions.

Summary for Alternative D on Locatable and Salable Minerals

Under this alternative, mineral development is unlikely due to land status and mineral potential (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). VRM classes would be designated for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

4.3.2.5 Off-Highway Vehicles

4.3.2.5.1 Direct and Indirect Effects Common to All Alternatives for Off-Highway Vehicles

Wildlife Effects on Off-Highway Vehicles (Common to All)

Under all alternatives, critical habitat for listed species across Alaska has been designated for USFWS and NMFS T&E species. Critical habitat designations may include additional seasonal or year-round stipulations limiting the amount of OHV use in these areas. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, it is dependent upon the purpose and function of the critical habitat, and the action resulting in adverse destruction or modification.

Forestry Effects on Off-Highway Vehicles (Common to All)

Some minimal forestry activity occurs generally within the Ring of Fire planning area each year. Within this plan, BLM would identify potential commercial harvest areas and high interest personal use areas. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. Temporary roads or short access roads for small timber operations may provide new access for OHV use, even though it would be on an extremely localized scale.

Lands and Realty Effects on Off-Highway Vehicles (Common to All)

The conveyance of BLM-managed lands removes the BLM policies that currently provide no restrictions on OHV use. OHV activity would then be subject to other agency policies and restrictions. BLM is working to complete the conveyance of Native- and State-selected lands by 2009. Once these lands are conveyed, the entity would own both the surface and subsurface mineral rights, unless otherwise stipulated. The management policies of the new landowner may either increase or decrease restrictions on OHV use.

4.3.2.5.2 Alternative A for Off-Highway Vehicles

Wildlife Effects on Off-Highway Vehicles (Alternative A)

Compliance, monitoring, and mitigation requirements would continue to be determined on a case-by-case basis. Permits or other wildlife management guidelines may contain seasonal or year-round stipulations limiting the amount of OHV use in certain areas.

Lands and Realty Effects on Off-Highway Vehicles (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may result in a minimal beneficial effect, on a very localized scale given the past acquisition trends of BLM, by increasing the amount of land available for unrestricted OHV use.

Summary of Alternative A Effects on Off-Highway Vehicles

Management proposed under Alternative A would maintain any effects on OHV use at their current levels. There are no OHV designations in place within the Ring of Fire planning area at this time, and use is allowed on all types of terrain. Through the acquisition of lands and easements, more lands may become available for OHV use, though these actions are not common within BLM. Management guidelines or stipulations related to fish and aquatic habitat, wetlands and riparian vegetation, and wildlife may have limitations on OHV use in certain areas. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative A would have minimal effects on OHV use and effects would be on a very localized scale.

4.3.2.5.3 Alternative B for Off-Highway Vehicles

Wildlife Effects on Off-Highway Vehicles (Alternative B)

Compliance, monitoring, and mitigation requirements would continue to be determined on a case-by-case basis. Permits or other wildlife management guidelines may contain seasonal or year-round stipulations limiting the amount of OHV use in certain areas.

Lands and Realty Effects on Off-Highway Vehicles (Alternative B)

Acquisitions – The acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may produce a minimal beneficial effect on a very localized scale given the past acquisition trends of BLM.

Leasable, Locatable, and Salable Minerals Effects on Off-Highway Vehicles (Alternative B)

Under this alternative, localized adverse effects to OHV use may occur. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

Summary of Alternative B Effects on Off-Highway Vehicles

Effects on OHV use from future management under Alternative B would most likely occur along the existing road network, and would primarily be limited to a small portion of BLM-managed lands. Lands would be designated as “open” to OHV use on all lands within the Ring of Fire planning area. Effects from forestry (less than 20 acres per year), ROWs, mining, and oil and gas developments would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative B would have minimal effects on OHV use and effects would be on a very localized scale.

4.3.2.5.4 Alternative C for Off-Highway Vehicles

Visual Effects on Off-Highway Vehicles (Alternative C)

The Neacola Mountains ACEC (Figure 2.4-5), the Lake Carlanna Municipal Watershed (Figure 2.4-6), and the Halibut Cove Forest Study Area (Figure 2.4-5) would be managed as VRM Class II. All other BLM-managed lands would be designated VRM Class III. These class designations may have effects on levels of OHV use due to the way that some large, braided trails affect the visual landscape in areas of high use such as the Knik River (Figure 2.4-5).

Lands and Realty Effects on Off-Highway Vehicles (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Management guidance for these areas may contain increased restrictions for OHV use.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may produce a minimal beneficial effect by increasing the amount of land available for OHV use. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. While land acquisitions may be seen as providing more areas for OHV use, the implementation plans that would be developed for these areas may have increased levels of restrictions for OHV use.

Leasable, Locatable, and Salable Minerals Effects on Off-Highway Vehicles (Alternative C)

The level of development potential, and overall effects associated with the development of leasable, locatable, and salable minerals would be similar to that of Alternative B. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

The following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-2)
- Halibut Cove Forest Study Area (Figure 2.3-1)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Through increased levels of planning or permitting efforts in these areas, the amount of land previously available to unrestricted OHV use may decrease. Under Alternative C, there are also seasonal and NSO constraints outlined for the Palmer Hay Flats (Figure 2.3-5) and areas in the Cape Lieskof region (Figure 2.3-9) of the Alaska Peninsula. Through the ROPs and permitting actions, as mentioned earlier, restrictions on OHV use in these areas may increase.

Recreation Effects on Off-Highway Vehicles (Alternative C)

Under Alternative C, SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection through the development of implementation plans in these areas and would be managed to meet the objectives of the specific SMAs (Appendix F). These step-down plans may contain increased guidelines and restrictions regarding recreational OHV use, especially in areas of high use, such as the Knik River area.

Wild and Scenic Rivers Effects on Off-Highway Vehicles (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Off-highway vehicle use within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Off-Highway Vehicles

Effects on OHV use from future management under Alternative C are likely to be minor in scale, or concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the recreation setting in high OHV-use areas such as the proposed Knik River SRMA. Effects from forestry, ROWs, mining, and oil and gas developments, would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). All of these actions may have some minor adverse effects on OHV use on BLM-managed lands, relative to the current management actions, by decreasing the amount of lands available for OHV use, or increasing restrictions.

4.3.2.5.5 Alternative D for Off-Highway Vehicles

Lands and Realty Effects on Off-Highway Vehicles (Alternative D)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA (Figure 2.3-4) would be identified as an avoidance area. Management guidance for this area may contain increased restrictions for OHV use in order to decrease conflicts between wildlife and OHVs.

Acquisitions – Acquisitions of lands and easements would be handled the same as described under Alternative C. Land and easement acquisitions may produce a minimal beneficial effect by increasing the amount of land available for unrestricted OHV use. In addition, the Knik River SRMA (Figure 2.3-5), the Haines Block SRMA, the Neacola Mountains ACEC (Figure 2.3-3), and the Iditarod NHT would be emphasis areas for land acquisitions. While land acquisitions may be seen as providing more areas for OHV use, the implementation plans that would be developed for these areas may have increased levels of restrictions for OHV use.

Leasable, Locatable, and Salable Minerals Effects on Off-Highway Vehicles (Alternative D)

Under Alternative D, effects would be the same as discussed under Alternative C, except only the Lake Carlanna Municipal Watershed (Figure 2.3-2) and the Halibut Cove Forest Study Area (Figure 2.3-1) would be closed to mineral entry. Any OHV use occurring on those lands would be allowed to continue at current levels.

Recreation Effects on Off-Highway Vehicles (Alternative D)

Management actions proposed under Alternative D are the same as those described under Alternative C. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). These step-down plans may contain increased guidelines and restrictions regarding recreational OHV use, especially in areas of high use, such as the Knik River.

Summary of Alternative D Effects on Off-Highway Vehicles

Effects to OHV use from future management under Alternative D are likely to be limited in scale, and concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the recreation setting in high OHV-use areas such as the proposed Knik River SRMA. Effects from forestry (approximately 20 acres per year), ROWs, mining, and oil and gas developments would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). SRMA implementation plans for the Knik River could result in areas specifically being designated as open, limited, or closed to OHV use. All of these actions may have adverse effects on OHV use on BLM-managed lands, relative to the current management actions, by decreasing the amount of lands available for OHV use, or increasing restrictions.

4.3.2.6 Recreation

4.3.2.6.1 Direct and Indirect Effects Common to All Alternatives for Recreation

Appendix H and Figures 3.6-1 through 3.6-3 (Appendix A) show how lands within the Ring of Fire planning area have been classified using the Recreation Opportunity Spectrum (ROS). Lands that were not originally classified through the report contained in Appendix H have been designated as semi-primitive motorized.

Wildlife Effects on Recreation (Common to All)

Within the Haines Block, operating conditions on the permits that are issued are in place to help mitigate against potential adverse effects to the mountain goat populations in the area. Preventing further disturbances to these populations may result in moderate, seasonal adverse effects on commercial recreation in this area.

Forestry Effects on Recreation (Common to All)

If timber harvest should occur, the construction of timber access roads, and subsequent trail development may alter access to certain areas for recreation use, recreation settings, and availability of recreation resources. However, if any of these areas were identified within proposed SMAs, management would be consistent with the objectives of the SMAs (Appendix F).

Lands and Realty Effects on Recreation (Common to All)

Land disposals to the State or Native corporations may possibly affect availability of some scattered parcels for recreation use (refer to Figures 1.2-2 through 1.2-4 for an illustration of current land status within the Ring of Fire planning area).

4.3.2.6.2 Alternative A for Recreation

Lands and Realty Effects on Recreation (Alternative A)

Acquisitions – Under Alternative A, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may produce a minimal beneficial effect by potentially increasing the amount of land available for recreation use.

Off-Highway Vehicle Effects on Recreation (Alternative A)

OHV use would remain unrestricted on BLM-managed lands within the planning area. Some conflicts may occur between non-motorized recreation users and OHV users in areas of high use such as the Knik River Valley. Adverse effects would be minimal, localized and short-term in nature.

Summary of Alternative A Effects on Recreation

Management proposed under Alternative A would maintain any effects on recreation at their current levels. Campbell Tract is the only SMA currently identified within the Ring of Fire planning area. Through the acquisition of lands and easements, a small amount of lands may become available for recreation use. Commercial recreation activity is currently limited by

permit. Some conflicts between motorized and non-motorized recreation users may occur in the Knik River Valley. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative A may have minor effects on recreation.

4.3.2.6.3 Alternative B for Recreation

Wildlife Effects on Recreation (Alternative B)

Compliance, monitoring, and mitigation requirements would continue to be determined on a case-by-case basis. Permits or other wildlife management guidelines may contain seasonal or year-round stipulations limiting recreation use in certain areas such as the Haines Block, where use could conflict with wildlife management objectives.

Lands and Realty Effects on Recreation (Alternative B)

Acquisitions – Under Alternative B, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may produce a minimal beneficial effect by potentially increasing the amount of land available for recreation use.

Leasable, Locatable, and Salable Minerals Effects on Recreation (Alternative B)

All unselected lands (486,000 acres) and any selected lands (798,000 acres) whose selections are relinquished or revoked are open for fluid mineral leasing and locatable mineral leasing and entry under this alternative. Areas that are already developed for mineral extraction may have restrictions within their Plans of Operations that may restrict recreation. Potential surface disturbance resulting from projected leasable mineral activities may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D), which may also restrict recreation access to certain areas, alter recreation settings, and change the availability of recreation resources to the public.

Through increased levels of planning or permitting efforts in these areas, the amount of land previously available to recreation use may decrease. Mineral leasing operations and development also have the potential to alter the recreation setting. The construction of facilities and ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely effect recreation resources. Land clearing, grading, construction, and drilling activities would create dust, noise, and increased traffic. These activities could have adverse effects on recreational uses because they would be visibly and audibly apparent during the recreational experience. The significance of any effect on recreation resource users would depend on the proximity to the development. Users could be inconvenienced if the ROW construction impedes access to recreational activities. However, effects would not likely be significant because of the temporary nature of the construction. The visual intrusion of these structures would be site-specific and would not affect recreationists outside the viewshed of each facility.

Off-Highway Vehicle Effects on Recreation (Alternative B)

All lands within the Ring of Fire planning area would be designated as “open” to OHV use. Effects on recreation use would be similar to Alternative A.

Summary of Alternative B Effects on Recreation

There would be no new SMAs established within the Ring of Fire planning area. Through the acquisition of lands and easements, more lands may become available for recreation use. The revocation of ANCSA 17(d)(1) withdrawals would allow for the leasing of fluid minerals and for the exploration and development of locatable and salable minerals on certain lands. Stipulations or other permit requirements around mineral exploration and development may have adverse effects on recreation use and access through restrictions in specific locations, and in other cases protect recreation uses and activities. However, given the low mineral development potential on BLM-managed lands (2,618 acres or less), effects would be minor. Recreation use may also be restricted in areas where there are conflicts with wildlife management objectives. Some conflicts between non-motorized recreation use and OHV use may occur in the Knik River Valley. Available information described in the sections above indicates that the adoption of the management actions, as described under Alternative B, may have a minimal adverse effect on recreation use and would be dispersed throughout the planning area.

4.3.2.6.4 Alternative C for Recreation

Wildlife Effects on Recreation (Alternative C)

Compliance, monitoring, and mitigation requirements would continue to be determined on a case-by-case basis. Implementation plans would be developed for the Knik River (Figure 2.3-5) and Haines Block SRMAs (Figure 2.3-4) that would, among other things, contain stipulations to address or protect wildlife concerns. These requirements may limit recreation use in certain areas where use conflicts with wildlife management objectives, such as within the Haines Block SRMA around sensitive mountain goat populations.

Visual Effects on Recreation (Alternative C)

The Neacola Mountains ACEC (Figure 2.4-5), the Lake Carlanna Municipal Watershed (Figure 2.4-6), and the Halibut Cove Forest Study Area (Figure 2.4-5) would be managed as VRM Class II. Visual resources in these areas would be maintained at the highest quality, helping to preserve the recreation setting and experiences found there. BLM-managed lands within the remainder of the planning area would be designated as VRM Class III.

Lands and Realty Effects on Recreation (Alternative C)

Access (ROWs) – The Mountain Goat Monitoring and Control Area within the Haines Block SRMA, and the Neacola Mountains ACEC (Figure 2.3-3) would both be identified as avoidance areas. Recreation use or access may be restricted in these areas through further planning efforts or permitting restrictions.

Acquisitions – Under Alternative C, the acquisition of lands and easements from willing landowners would be considered on a case-by-case basis. Land and easement acquisitions may produce a minimal beneficial effect by potentially increasing the amount of land available for recreation use. In addition, the Knik River SRMA, the Haines Block SRMA, the Neacola

Mountains ACEC, and the Iditarod NHT would be emphasis areas for land acquisitions. While land acquisitions may be seen as providing more areas for recreation use, the implementation plans that would be developed for these areas may have increased levels of restrictions on recreation use to avoid resource conflicts and meet outlined objectives of the SMAs.

Leasable, Locatable, and Salable Minerals Effects on Recreation (Alternative C)

Under Alternative C, 241,000 acres of unselected lands, and any selected lands (387,000 acres) whose selections are relinquished or revoked are open for fluid mineral leasing. Approximately 486,000 acres of unselected lands are available for locatable and salable mineral entry. Through increased levels of planning or permitting efforts in these areas, the amount of land previously available to recreation use may decrease under Alternative C, but not to the level of Alternative B. Mineral leasing operations and development also have the potential to alter the recreation setting. Potential surface disturbance resulting from projected leasable mineral activities may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). All activities, including all mineral activities, on BLM-managed lands will be subject to ROPs and/or stipulations (Appendix D).

This alternative would provide fewer opportunities for development activities, and thus surface disturbance and construction of facilities would be curtailed, which would likely benefit disperse recreation resources and resources users. The following areas, some of which currently have recreation use, of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry, so current users would see no change in their recreation setting from mineral development:

- Lake Carlanna Municipal Watershed (Figure 2.3-1)
- Halibut Cove Forest Study Area (Figure 2.3-2)
- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Off-Highway Vehicles Effects on Recreation (Alternative C)

All lands would be designated as “limited” to OHV use, consistent with the *Generally Allowed Uses on State Land* (Appendix E) under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). This may result in a beneficial effect to remote backcountry users, as OHV use would be restricted to existing trails. Within the Knik River SRMA, Haines Block SRMA, and Neacola Mountains ACEC, limitations to OHV use would be further refined to meet the objectives of the SMAs. Further implementation planning may also be designed to reduce conflicts between motorized and nonmotorized recreation users in areas of high OHV use, such as the Knik River Flats.

Wild and Scenic Rivers Effects on Recreation (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Recreation use within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Recreation

SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Recreation resources and uses would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Additional mineral leasing restrictions that may, among other things, limit or protect recreation use would be put in place for certain sensitive or unique areas. However, given the small number of acres designated as having high mineral development potential on BLM-managed lands, 2,618 acres or less), effects would be minor. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E). While some of these actions may adversely affect recreation, such as increasing restrictions on use or access in certain areas, the majority of the actions proposed under Alternative C would have beneficial effects on recreation use, access, and the preservation of recreation settings relative to current management actions.

4.3.6.2.5 Alternative D for Recreation

Wildlife Effects on Recreation (Alternative D)

Actions proposed under Alternative D for wildlife would have similar effects on recreation as discussed under Alternative C.

Visual Effects on Recreation (Alternative D)

The Lake Carlanna Municipal Watershed (Figure 2.4-9), and the Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II. Visual resources in these areas would be maintained, helping to preserve the recreation setting and experiences found there. The Neacola Mountains would be managed as VRM Class II, and all remaining lands in the planning area would be designated as VRM Class IV, which would allow landscape modification that could adversely affect the recreation experience of some users.

Lands and Realty Effects on Recreation (Alternative D)

Actions and effects under Alternative D for ROWs and land acquisitions would be the same as discussed under Alternative C, except the Neacola Mountains ACEC (Figure 2.3-3) would not be identified as an avoidance area.

Leasable, Locatable, and Salable Minerals Effects on Recreation (Alternative D)

Under Alternative D, effects would be the same as discussed under Alternative B, except the Lake Carlanna Municipal Watershed (Figure 2.3-2) and the Halibut Cove Forest Study Area (Figure 2.3-1) would be closed to mineral entry. Any recreation use currently occurring on those lands would be preserved.

Off-Highway Vehicles Effects on Recreation (Alternative D)

OHV effects on recreation use, access, and experience under Alternative D would be similar to management proposed under Alternative C. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). However, further planning efforts in the three proposed SMAs may designate areas as “open” to OHV use. This action would not alter the existing recreation experience in any of these areas, as lands are currently undesignated for OHV use.

Summary of Alternative D Effects on Recreation

SRMAs are identified in the Knik River (Figure 2.3-5) and the Haines Block (Figure 2.3-4), and an ACEC is identified in the Neacola Mountains. Resources, particularly wildlife, would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Additional mineral leasing restrictions that may, among other things, limit or protect recreation use, would be put in place for certain sensitive or unique areas. However, given the low mineral development potential on BLM-managed lands (2,618 acres or less), effects would be minor. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E). While some of these actions may adversely affect recreation, such as increasing restrictions on use or access in certain areas, the majority of the actions proposed under Alternative D would have beneficial effects on recreation use, access, and the preservation of recreation settings relative to current management actions.

4.3.3 Special Designations

4.3.3.1 Special Management Areas

Currently, the only SMA located within the Ring of Fire planning area is the Campbell Tract located in Anchorage. There are three areas being given SMA status under Alternatives C and D. The recreation attributes of the Knik River (SRMA) and Haines Block (SRMA) and the recreation and scenic qualities of the Neacola Mountains (ACEC) have contributed to the designation of these SMAs. The effects to the values encompassed in each of these SMAs are discussed in other sections of this chapter, including wildlife, visual, recreation, etc.

4.3.3.1.1 Direct and Indirect Effects Common to All Alternatives for Special Management Areas

Alternatives C and D are the only alternatives where new SMAs are identified. Because Alternatives A and B do not make any recommendations for designation, they will not be discussed further in this section.

4.3.3.1.2 Alternative C for Special Management Areas

Recreation Effects on Special Management Areas (Alternative C)

The Knik River (Figure 2.3-5) and the Haines Block (Figure 2.3-4) will be managed as SRMAs. The Neacola Mountains will be managed as an ACEC (Figure 2.3-3). Resources would receive further levels of protection in these areas through the development of implementation plans in these areas. The objectives of each of the SMAs (Appendix F) would be designed to minimize resource conflicts and to promote management collaboration with adjacent landowners.

Wild and Scenic Rivers Effects on Special Management Areas (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Identified ORVs for these river segments would receive some degree of consideration when reviewing proposed actions that might have an effect on the ORVs.

Summary of Alternative C Effects on Special Management Areas

Under Alternative C, Knik River and Haines Block will be managed as SRMAs and the Neacola Mountains will be managed as an ACEC. The special recreational values and scenic quality attributes in these areas, prompt SMA designations. Objectives outlined for these three areas can be seen in Appendix F.

4.3.3.1.3 Alternative D for Special Management Areas

Recreation Effects on Special Management Areas (Alternative D)

The Knik River and the Haines Block will be managed as SRMAs. The Neacola Mountains will be managed as an ACEC. Resources would receive further levels of protection in these areas through the development of implementation plans in these areas. The objectives of each of the SMAs (Appendix F) would be designed to minimize resource conflicts and to promote management collaboration with adjacent landowners.

Summary of Alternative D Effects on Special Management Areas

Under Alternative D, Knik River and Haines Block would be managed as SRMAs and the Neacola Mountains would be managed as an ACEC. The special recreational values and scenic quality attributes in these areas, prompt SMA designations. Objectives outlined for these three areas can be seen in Appendix F.

4.3.3.2 Wild and Scenic Rivers

Currently, there are no designated WSRs on BLM-managed lands within the Ring of Fire planning area. Fourteen river segments were identified as eligible for WSR designation under Alternative C, but were not determined to be suitable for designation as WSRs. The outstandingly remarkable values (ORVs) of these river segments have contributed to their potential designation as WSRs. The effects to the values encompassed in each of these river segments are discussed in other sections of this chapter, including wildlife, visual, recreation, etc. Eligible river segments determined to be non-suitable through the WSR process would still be subject to a number of alternative protective methods and management decisions. Identified ORVs for these river segments would be taken into consideration when reviewing proposed actions that might have an effect on the ORV. Because Alternatives A, B, and D do not make any recommendations for designation, they will not be discussed further in this section.

4.3.3.2.1 Direct and Indirect Effects Common to All Alternatives for Wild and Scenic Rivers

Wildlife Effects on Wild and Scenic Rivers (Common to All)

Under all alternatives, critical habitat for listed species across Alaska has been designated for USFWS and NMFS T&E species. Critical habitat designations may include additional seasonal or year-round stipulations limiting activities in these areas. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, it is dependent upon the purpose and function of the critical habitat, and the action resulting in adverse destruction or modification. To the extent that critical habitat has been identified as an ORV in any of the 14 river segments, it will be taken into consideration when reviewing proposed actions that might have an effect on this specific ORV.

Forestry Effects on Wild and Scenic Rivers (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Within this plan, BLM would identify potential commercial harvest areas and high interest personal use areas. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest will occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads could be constructed to access parcels of timber in the future. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. Timber harvesting has been shown to have varying degrees of adverse effects on water resources, such as altering hydrologic processes (FEMAT 1993; USFS 2002a), which could in turn affect identified values or the free-flowing character of river segments unless appropriately mitigated. ORVs will be taken into consideration when reviewing proposed forestry actions.

Lands and Realty Effects on Wild and Scenic Rivers (Common to All)

BLM is working to complete the conveyance of Native- and State-selected lands by 2009. Once these lands are conveyed, the entity would own both the surface and subsurface mineral rights, unless otherwise stipulated. The management intentions of the new landowner may have effects on identified values of eligible WSR segments.

Leasable, Locatable, and Salable Minerals Effects on Wild and Scenic Rivers (Common to All)

Mining and oil and gas leasing could have adverse effects on the free-flowing character or maintenance of identified values of eligible WSR segments. If roads were authorized through ROWs associated with development on non-BLM-managed lands, or other development associated with mining or oil and gas leasing, there could be localized, but potentially long-term effects to the free-flowing character of river segments. ORVs will be taken into consideration when reviewing proposed mineral development actions.

4.3.3.2.2 Alternative C for Wild and Scenic Rivers

Leasable, Locatable, and Salable Minerals Effects on Wild and Scenic Rivers (Alternative C)

Given the small number of acres designated as having high mineral development potential on BLM-managed lands, the effects of mineral development on eligible WSR segments would be negligible. Potential surface disturbance resulting from projected leasable mineral development may affect approximately 2,558 acres (Appendix G). Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D), and could contain additional provisions to protect the free-flowing character and ORVs identified for eligible river segments.

Off-Highway Vehicles Effects on Wild and Scenic Rivers (Alternative C)

Lands would be designated as limited to existing roads and trails to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limiting OHV use within the Ring of Fire planning area could reduce any localized, adverse effects to eligible WSR segments relative to the current level of effects from OHV use, including increased levels of erosion and sedimentation, or the alteration of surface drainage patterns. Several rivers have been identified for their recreational values, which could include OHV use.

Summary of Alternative C Effects on Wild and Scenic Rivers

Effects to any of the eligible river segments for WSR designation under Alternative C are likely to be limited in scale, or concentrated in specific areas. Effects from forestry (approximately 20 acres per year), land conveyance, mining, and oil and gas developments would likely be limited, and may not overlap with river corridors; consequently potential effects would be minimal. OHV use would be designated as limited to existing roads and trails, possibly contributing to a reduction in seasonal adverse effects where they occur in eligible WSR corridors.

4.3.4 Social and Economic

4.3.4.1 Socioeconomic

4.3.4.1.1 Direct and Indirect Effects Common to All Alternatives for Socioeconomics

Economic activity could be stimulated in the planning area via extractive and non-extractive industries that utilize BLM-managed lands and resources. The magnitude and extent of economic activity that could be generated is uncertain at this scale of planning.

Economic activity could in turn, stimulate population increases in the Ring of Fire planning area. The population effects could be directly or indirectly associated with the economic stimuli. The extent and magnitude of the changes in population would likely be related to the extent and magnitude of the economic activity. Ethnicity, age, and migration are closely linked to population. Changes in these indicators would likely be commensurate with changes in population. While poverty rates are a demographic indicator, they are also linked to the economic element. Changes to the poverty indicator would likely be commensurate with changes in population and economy.

Forestry Effects on Socioeconomics (Common to All)

Some minimal forestry activity generally occurs within the Ring of Fire planning area each year. Timber harvesting has the potential to stimulate job creation and economic activity in an area. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future, so effects would be extremely localized. Actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula.

Hazardous Materials Effects on Socioeconomics (Common to All)

The BLM management actions under all alternatives for hazardous materials may have localized, beneficial effects on socioeconomic resources through prevention measures, and mitigation practices, as sites become known that are near known communities.

4.3.4.1.2 Alternative A for Socioeconomics

Leasable, Locatable, and Salable Minerals Effects on Socioeconomics (Alternative A)

Economic activity could be stimulated via resource development of leasable, locatable, and/or salable minerals within the Ring of Fire planning area. Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G).

Off-Highway Vehicle Effects to Socioeconomics (Alternative A)

OHV use on BLM-managed lands would remain unrestricted. OHV use generates economic activity associated with fuel and equipment sales and rental, and expenditures on fuel and lodging. Potential effects would be greatest in the proximity of high OHV use areas, such as the Knik River Valley.

Summary of Alternative A Effects on Socioeconomics

Effects to socioeconomic resources from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands, and would most likely occur along the existing road network. Small areas of forestry (approximately 20 acres per year) or mineral development may cause beneficial economic effects on a minimal, localized scale. Beneficial economic effects could also be felt through continued undesignated OHV use, especially in popular recreation areas such as the Knik River Valley.

4.3.4.1.3 Alternative B for Socioeconomics

Leasable, Locatable, and Salable Minerals Effects on Socioeconomics (Alternative B)

Economic activity could be stimulated via resource development of leasable, locatable, and/or salable minerals within the Ring of Fire planning area. Under this alternative, more lands would be made available than under Alternative A for mineral leasing or locatable or salable mineral entry. However, the RFDs for minerals, as discussed under Alternative A, indicate that a total of 2,558 acres have potential for oil and gas disturbance (all ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands.

Off-Highway Vehicles Effects on Socioeconomics (Alternative B)

All lands within the Ring of Fire planning area would be designated as “open” to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). There is a potential to generate limited economic activity through this continued level of recreation activity, similar to Alternative A.

Summary of Alternative B Effects on Socioeconomics

Effects to socioeconomic resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per year) may cause beneficial economic effects on a minimal, localized scale. While revocation of ANCSA 17(d)(1) withdrawals could open additional lands to mineral exploration, the amount of additional mineral development is expected to be limited. Beneficial economic effects through local expenditures could also be felt through continued undesignated OHV use, especially in popular recreation areas such as the Knik River.

4.3.4.1.4 Alternative C for Socioeconomics

Leasable, Locatable, and Salable Minerals Effects on Socioeconomics (Alternative C)

Economic activity could be stimulated via resource development of leasable, locatable, and/or salable minerals within the Ring of Fire planning area. Under this alternative, more lands would be made available than under Alternative A, but less than Alternative B, for mineral leasing or locatable or salable mineral entry. However, projected mineral development would be limited in extent due to mineral potential (Appendix G). The RFDs for minerals indicate that a total of 2,558 acres have potential for oil and gas disturbance (all ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands. There are several areas that are specifically identified as closed to mineral entry (Tables 2.3-2 and 2.3-3), which could have either adverse (loss of jobs or revenue) or beneficial socioeconomic effects.

Off-Highway Vehicles Effects on Socioeconomics (Alternative C)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River (Figure 2.3-5) and Haines Block SRMAs (Figure 2.3-4), and the Neacola Mountains ACEC (Figure 2.3-3) implementation plans. Limiting use within the Ring of Fire planning area may cause a slight decrease in economic activity created through this recreation activity.

Recreation Effects on Socioeconomics (Alternative C)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. The creation of these SMAs could stimulate economic activity in these areas through increases in tourism and recreation activities.

Wild and Scenic Rivers Effects on Socioeconomics (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

The potential for increases in tourism and recreation activities within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Socioeconomics

Effects to socioeconomic resources from future management under Alternative C are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per year) or mineral development (up to 2,618 acres total) may cause beneficial economic effects on a minimal, localized scale. Some beneficial economic effects from increased recreation expenditures could also be seen from SMA designations. Minor adverse economic effects from reductions in expenditures could potentially be felt from limiting OHV use, especially in popular recreation areas such as the Knik River.

4.3.4.1.5 Alternative D for Socioeconomics

Leasable, Locatable, and Salable Minerals Effects on Socioeconomics (Alternative D)

Economic activity could be stimulated via resource development of leasable, locatable, and/or salable minerals within the Ring of Fire planning area. The amount of lands available for mineral leasing or locatable and salable mineral entry under this alternative would be the same as discussed under Alternative B. However, projected mineral development would be limited in extent due to mineral potential (Appendix G). The RFDs for minerals indicate that a total of 2,558 acres have potential for oil and gas disturbance (all ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands. There are several areas that are specifically identified as closed to mineral entry (Tables 2.3-2 and 2.3-3), which could have either adverse (loss of jobs or revenue) or beneficial socioeconomic effects.

Off-Highway Vehicles Effects on Socioeconomics (Alternative D)

Lands would be designated as limited to OHV use consistent with ADNR's *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may cause a slight decrease in economic activity as a result of this recreation activity.

Recreation Effects on Socioeconomics (Alternative D)

SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas. The creation of these SMAs could stimulate economic activity in these areas through increases in tourism and recreation activities.

Summary of Alternative D Effects on Socioeconomics

Effects to socioeconomic resources from future management under Alternative D are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per

year) or mineral development (up to 2,618 acres total) may cause beneficial economic effects on a minimal, localized scale. While revocation of ANCSA 17(d)(1) withdrawals could open additional lands to mineral exploration, the amount of additional mineral development is expected to be limited. Beneficial economic effects from additional recreation expenditures could also be seen from SMA designations. Minimal adverse economic effects from reductions in expenditures could potentially be felt through the limiting of OHV use, especially in popular recreation areas such as the Knik River.

4.3.4.2 Subsistence

4.3.4.2.1 Direct and Indirect Effects Common to All Alternatives for Subsistence

This section examines the direct and indirect effects of activities under the Ring of Fire PRMP/FEIS on subsistence activities, broadly defined, as they occur on all 1.3 million acres of BLM-managed land. BLM-managed lands area displayed on Figures 1.2-2 through 1.2-4 (Appendix A), and community subsistence use areas are displayed, along with BLM-managed land parcels on Figures 3.5-2 through 3.5-4 (Appendix A).

Although this discussion focuses on land management decisions, it is important to recognize that subsistence uses are defined differently and regulated differently by Federal and State management regimes, depending on land status. The Federal Subsistence Board manages subsistence harvests by rural Alaska residents on unencumbered BLM-managed lands, implementing the rural subsistence priority established in Title VIII of ANILCA. The Alaska Boards and Fisheries and Game regulate hunting and fishing on State and private lands. State managed hunting and fishing is also generally authorized on Federal lands unless these have been closed to non-Federally qualified hunting and fishing for reasons of conservation, providing for the federal subsistence program, or public safety. State fish and wildlife management recognizes a subsistence priority, though it is defined differently from the Federal statutes, in that all Alaskans qualify for State-managed subsistence hunting and fishing Federally defined subsistence uses occur only on the 486,000 acres of unencumbered BLM-managed lands, while on the 798,000 acres of State and Alaska Native selected lands under BLM management, the subsistence activities authorized are those regulated by the State.

Direct effects to subsistence from proposed actions are those occurring on BLM-managed lands, while indirect effects result from BLM managed or permitted activities under the plan but extend beyond the boundaries of BLM-managed lands. BLM-managed lands (selected and unencumbered) represent just two percent of the 61.4 million acres of total lands in the Ring of Fire planning area. Only a few large blocks of BLM-managed lands are found in the planning area, including the Haines blocks in the Southeast region, and the Neacola Mountains blocks in the Southcentral region. The remainder of the BLM-managed lands are found in very small, widely dispersed parcels. Analysis of proximity of a block of unencumbered BLM-managed lands to subsistence use areas will be offered where possible. However, data are not available to precisely describe the physical and biological character of the smaller parcels of BLM-managed lands, and therefore the importance of these parcels of land to subsistence users.

Subsistence hunting and fishing opportunities under federal or State management continue without direct effects from the Ring of Fire PRMP/FEIS, since management of subsistence harvests is not a land management activity.

<u>Fisheries Effects on Subsistence (Common to All)</u>

The Federal Subsistence Board, in which the BLM participates, manages subsistence fisheries on federal lands; including non-navigable waters on federal lands, and inland, navigable waters within and adjacent to federal conservation system units, such as National Parks, National Wildlife Refuges and National Forests. The Federal Board does not manage commercial or sport fisheries, and with very limited exceptions, ANILCA Title VIII does not apply in marine waters.

In general, throughout the planning area, subsistence fish resources are healthy, and subsistence harvest practices on BLM-managed lands are robust. Strategies for maintaining subsistence food ways include sharing, reserving portions of commercial harvests for subsistence uses, and educational fisheries. In the planning area as a whole, competition with non-local and commercial harvesters is an ongoing issue, as in the Southeast region for example, where allocation disputes over state-managed subsistence harvests of salmon in marine waters have been significant. However, the focus of this analysis is on subsistence harvests on the BLM managed lands.

Wildlife Effects on Subsistence (Common to All)

Under all alternatives, critical habitat for listed species across Alaska has been designated for USFWS and NMFS managed T&E species. Critical habitat designation would be beneficial for any subsistence species located within the area. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited.

Wildland Fire and Fuels Management Effects on Subsistence (Common to All)

Fire management and activities pertaining to maintenance or improvement of the timber value of parcels may include constructing firebreaks; thinning forest stands; and prescribing burns to remove deadfall and understory. These activities may have direct effects on terrestrial, riverine, and lacustrine habitats with direct and indirect effects on dependent subsistence resources. Siltation from prescribed burns, forest roads, and firebreak cutting can affect fish habitat and stream characteristics.

Forestry Effects on Subsistence (Common to All)

Minimal forestry activity generally occurs on BLM-managed lands within the Ring of Fire planning area. Historically, timber harvests have not exceeded approximately 20 acres per year, with little road construction activity. It is expected that a similar volume of harvest would occur in the foreseeable future. While no major road construction has occurred as a result of timber harvest, it is not inconceivable that short spur, or temporary roads may be constructed to access parcels of timber in the future. Given the relatively low value and limited demand for the timber in the Ring of Fire planning area, most of the timber harvested would come as an ancillary benefit from other construction projects such as ROW clearing or other permitted activities.

Timber harvest actions have tended to be concentrated on scattered parcels of BLM land throughout the Matanuska-Susitna Valley and the Kenai Peninsula. Depending on the scale of the operation, the direct effects of forest resource management practices would include changes in subsistence resource availability caused by habitat modification. In addition, infrastructure built to facilitate wildland fire management and harvest would increase access for both subsistence and non-local users, increasing competition and concentrating user harvest effort into access corridors. Although not historically part of the small-scale timber operations on BLM-managed lands, application of herbicides and insecticides to increase timber value could have unpredictable effects on other biological resources in the area, reducing availability through reduced population abundance or through local perceptions of contamination or scarcity. Given the low level of timber harvest activity on BLM-managed lands within the Ring of Fire planning area, potential effects would be minor in scale.

Lands and Realty Effects on Subsistence (Common to All)

Depending on location and scale, identification and designation of easements and rights-of-way for transportation, powerline, and pipeline corridors could have adverse effects on subsistence by increasing access to subsistence resources in those corridors. Non-local and subsistence user harvests could be concentrated in those corridors, and competition could also increase between user groups in easily accessible areas opened up by designating easements. Subsequent development of these easements, and development of land parcels accessed by transportation opportunities created by easement designation and development would result in increased competition for subsistence resources in the vicinity of the corridor, and in adjacent areas of private land.

Leasable, Locatable, and Salable Minerals Effects on Subsistence (Common to All)

Mineral and coal exploration, including testing for oil and gas, as well as hard-rock minerals, may involve the use of seismic testing and test drilling. These activities may deflect terrestrial and marine mammals several miles from their normal routes, and may disturb nesting, brooding, and fledgling birds and waterfowl (BLM 2005s). Depending on the location, frequency, and scale, this deflection could reduce resource availability for subsistence users in directly affected areas and increase competition in other areas, as harvesters are required to travel to other areas to harvest resources.

Infrastructure to support exploration and prospecting activity may include cutting trails, roads, and seismic lines, as well as the development of barge landings, airstrips, and helipads. For seismic surveys and test drilling, camps or other cat trains may be used to support the testing program, deflecting terrestrial and marine mammals from the area of operations up to several miles from normal paths. Aircraft use may disturb or deflect animals as well as resource users attempting to harvest a resource while activity is taking place in the general vicinity (BLM 2005s).

Depending on location and scale, adverse effects to subsistence may occur due to the development of areas for sand and gravel extraction. Noise and activity could deflect migratory animals and subsistence users dependent upon them from the area of operations for the duration of the activity. Lakes left in place as gravel dredge pits fill in with water may attract waterfowl, which may deflect them from their normal habitat areas and make them unavailable for subsistence users in their usual locations. Infrastructure related to transporting sand and gravel to a project location could increase access to the area, potentially increasing competition for subsistence resources in the vicinity of the gravel pit during operations and following closure if roads are left in place (BLM 2004t).

Recreation Effects on Subsistence (Common to All)

BLM assumes in this PRMP/FEIS that demand for recreational use of public lands in the Ring of Fire planning area is expected to increase over the next 10 to 15 years (Section 4.2.4). Increases are expected in recreational OHV use, sport fishing, hiking, canoeing/rafting, and highway tourism from the road system. Commercial recreation applicants are also expected to increase. Where recreational access increases, competition for subsistence resources may also increase. In addition, subsistence users may avoid areas where non-locals congregate and may have to travel farther to obtain subsistence resources.

4.3.4.2.2 Alternative A for Subsistence

Leasable, Locatable, and Salable Minerals Effects on Subsistence (Alternative A)

Under Alternative A, BLM-managed lands would be closed to fluid mineral leasing; however BLM has the authority to lease federal lands where oil and gas is being drained from wells on adjacent non-federal lands. All BLM-administered lands within the planning area would be open to hard rock mineral exploration, and those areas subject to leasing under 43 CFR 3400.2 would be open to coal exploration and study. Approximately 486,000 acres of unselected lands within the Ring of Fire planning area are available for the sale of mineral materials. Projected locatable mineral development may affect up to 60 acres, and development of salable minerals on BLM-managed lands is unlikely (Section 4.2.4 and Appendix G). Potential effects from mineral exploration and development are discussed under *Direct and Indirect Effects Common to All Alternatives*.

Off-Highway Vehicles Effects on Subsistence (Alternative A)

Under Alternative A, BLM will make no OHV use designation of its lands, leaving all lands unrestricted to OHV use, except for the OHV closures at Campbell Tract and restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Effects on subsistence resources from OHVs include habitat changes due to overuse of routes, trail braiding, and the deflection of subsistence resources by the motion and noise of OHVs, but the scale of these potential effects is dependent on the proportion of BLM-managed lands within the subsistence use areas of communities in the Ring of Fire planning area, and on the characteristics of these lands including the value of those lands as harvest areas and the proximity of those lands to the community. Potential adverse effects may be moderate in localized areas of high OHV use, or even intense in areas such as the Knik River valley, but are minor on a regional scale.

OHVs enable subsistence users to range further in pursuit of resources that may be scarce closer to the home communities. Beneficial effects from OHVs include the ability to access a wider range of habitats and resources in a much shorter time than other modes of transportation. Adverse effects include issues with increased costs in time, money, effort, and wear associated with the necessity of traveling further from the population center to harvest subsistence resources, the focus of harvest efforts along established trails and routes, and the deflection of subsistence resources from the noise, activity, and smell of mechanized transportation. Competition for resources along established routes may increase within and between communities.

Summary of Alternative A Effects on Subsistence

The management actions proposed under the various management categories of Alternative A would have a variety of effects on the subsistence resources and uses on BLM-managed lands. All the proposed actions would maintain the effects to the subsistence use at current levels. Minimal forestry activity (approximately 20 acres per year) may cause minor, site-specific adverse effects to subsistence, unless appropriately mitigated. Any possible effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance due to mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. However, as BLM

continues to allow OHV use and other recreational activities to go unrestricted, adverse effects to subsistence users and resources could continue. Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A would have a minimal adverse effect on subsistence resources.

4.3.4.2.3 Alternative B for Subsistence

Lands and Realty Effects on Subsistence (Alternative B)

Alternative B recommends revocation of ANCSA 17(d)(1) withdrawals and restoring them to the public domain, revocation other agency withdrawals as requested by the holding agency, evaluation and designation of surface transportation routes, transfer of easement routes to State management, and reservation, marking, and verification of 17(b) easements as part of conveyance of parcels to Native corporations. Changes to land withdrawal status could have unforeseen effects on subsistence resources and users should lands be put into use for extractive industries, although effects would likely be minor given the limited mineral development potential on BLM-managed lands. Despite the limited lands under BLM management, the loss of access to lands presently under BLM management could reduce or block subsistence user access to harvest locations and traditional camps and sites at a small geographic scale relative to total subsistence use areas.

Identification, designation of, and transfer of easements and rights of way for transportation, power line, and pipeline corridors associated with resource development would have adverse effects on subsistence, and would result in increased competition for subsistence resources in the vicinity of the corridor and in adjacent areas of private land. However, given the limited mineral development potential on BLM-managed lands, potential adverse effects on subsistence would be minor. Conveyance of parcels to Native corporation ownership may increase the likelihood that these parcels will be developed in a manner incompatible with subsistence resource harvests.

Leasables, Locatables, and Salables Effects on Subsistence (Alternative B)

Under this alternative, localized adverse effects to subsistence resources and users may occur (described in *Direct and Indirect Effects Common to All*), but projected mineral development would be limited in extent due to limited mineral development potential (Appendix G). The RFDs for minerals indicate that a total of 2,558 acres have potential for disturbance due to oil and gas development (all ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands. Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D), further reducing the potential for effects in areas where development may occur.

Off-Highway Vehicles Effects on Subsistence (Alternative B)

Under Alternative B, all BLM-managed lands within the Ring of Fire planning area would be designated as “open,” with the exception of the closures at Campbell Tract and on BLM parcels within Chugach State Park. Because OHV use on BLM-managed lands is currently unrestricted, this management action would have similar effects on subsistence resources as Alternative A.

Summary of Alternative B Effects on Subsistence

The management actions proposed under the various management categories of Alternative B would maintain the effects on the subsistence use at its current levels. Minimal forestry activity (approximately 20 acres per year) may cause site-specificadverse effects to subsistence, unless appropriately mitigated. Any possible effects from BLM fisheries and wildlife program efforts, or from fire management would be minimal, and would likely not extend to the regional level. Any disturbance due to mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. Changes to land withdrawal status could have unforeseen effects to subsistence resources, and unrestricted OHV use could cause habitat changes due to overuse of routes, trail braiding, and the deflection of subsistence resources by the motion and noise of OHVs in those areas where access and demand allow for concentrated and growing use of BLM-managed lands for this purpose. Available information described in the sections above indicates that the adoption of the current management actions, as described under Alternative B, would have a minimal adverse effects on subsistence resources at localized, not regional or resource population, levels.

4.3.4.2.4 Alternative C for Subsistence

Lands and Realty Effects on Subsistence (Alternative C)

Under Alternative C, the effects of land disposals on subsistence would be the same as those discussed under Alternative A. Potential adverse effects on subsistence would stem from the designation of easements and rights of way across otherwise withdrawn land. Increased access to these lands would increase competition between and within subsistence and sports hunter groups. Easements and ROWs may increase the likelihood that BLM managed lands and adjacent parcels managed by other agencies and private landowners would be developed for uses incompatible with subsistence resource harvests. Development that tiers off of new easements and ROW may deflect subsistence resources, thus reducing subsistence resource availability. However, the Haines Mountain Goat Monitoring and Control Area, and the Neacola Mountains ACEC would be identified as avoidance areas, where more specific measures will be developed through implementation-level planning efforts to reduce effects on key wildlife and habitat resources.

Leasables, Locatables, and Salables Effects on Subsistence (Alternative C)

The level of development potential, and overall effects for leasable, locatable, and salable minerals would be similar to that in Alternative B. Projected mineral development would be limited in extent due mineral potential (Appendix G), thereby maintaining current conditions of subsistence resources. The RFDs for minerals indicate that a total of 2,558 acres have potential for disturbance from oil and gas development (all land ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands.

However, the following areas of both selected and unselected lands would remain closed to leasable, locatable and salable mineral entry:

- Lake Carlanna Municipal Watershed (Figure 2.3-1)
- Halibut Cove Forest Study Area (Figure 2.3-2)

- Neacola Mountains ACEC (Figures 2.3-1 and 2.3-3)
- Knik River SRMA (Figures 2.3-1 and 2.3-5)
- Haines Block SRMA (Figures 2.3-2 and 2.3-4)
- Ursus Cove (Figure 2.3-7)

Fluid mineral leasing, coal exploration, non-energy, leasable, and locatable mineral prospecting on BLM-managed lands would be subject to ROPs and stipulations (Appendix D). Under Alternative C, there are also seasonal and NSO constraints outlined for the Palmer Hay Flats and areas in the Cape Lieskof area of the Alaska Peninsula. Exploration and development in the near shore and continental shelf environments, such as Cape Lieskof, could deflect subsistence resources including marine mammals, shore and sea birds, and fish. However, in the areas identified as closed to mineral entry, or identified with seasonal or NSO constraints, subsistence resources should maintain their current conditions and remain protected from future mineral exploration and development.

Off-Highway Vehicles Effects on Subsistence (Alternative C)

BLM-managed lands would be designated as “limited” to OHV use consistent with ADNR’s *Generally Allowed Uses on State Land* (Appendix E), which requires such actions as restricting use to existing trails whenever possible. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limitations on OHV use would also be further refined within the Knik River and Haines Block SRMAs, and the Neacola Mountains ACEC implementation plans. Limiting use within the Ring of Fire planning area may reduce adverse effects to subsistence resources relative to the current level of effects. OHV designations, if conducted with the cooperative input of local communities, could be beneficial for subsistence if trails are designated and managed to reduce erosion, disperse hunter effort, and ease travel. Restrictions in some areas could reduce subsistence user access, adversely affecting subsistence users’ access to resources, focusing hunting effort on fewer areas, and increasing competition for limited resources available in those corridors. Subsistence resource habitat would be improved by reducing the number of braided trails, channeling users into fewer and more specific corridors, and initiating trail maintenance and improvement designed to reduce the damage caused by the activity to lands and waters of the planning area.

Recreation Effects on Subsistence (Alternative C)

Recreational effects to subsistence resources on BLM-managed lands would likely be similar to current levels of effects, and would be reduced in the three SMAs. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. All resources would receive further levels of protection through the development of implementation plans in these areas, including subsistence activities. Outside of the SMAs, it is possible, but less likely that concentrated use would result in adverse effects from lack of management and monitoring, reducing the productivity of some areas and potentially affecting population numbers of some species (Wilmot 2004; Fritz 2005). Where recreational access increases, competition for subsistence resources may also increase. In addition, subsistence users may avoid areas where non-locals congregate and may have to travel farther to obtain subsistence resources.

Wild and Scenic Rivers Effects on Subsistence (Alternative C)

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

Subsistence resources within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments.

Summary of Alternative C Effects on Subsistence

Effects to subsistence resources from future management under Alternative C are likely to be limited in scale to localized, specific areas. Minimal forestry activity (approximately 20 acres per year on BLM-managed lands) may cause adverse effects to subsistence, unless appropriately mitigated. Any possible effects from BLM fisheries and wildlife programs, or fire management would be minimal and localized, and would likely not extend to the regional or resource population level. Any disturbance due to mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres total), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects on subsistence use and resources. Some management actions, such as WSR designations and establishment of SMAs may provide additional protections to subsistence resources and recovery for any previously affected resources, resulting in a beneficial effect. However, where recreational access increases, competition for subsistence resources may also increase. Available information described in the sections above indicates that the adoption of the management actions may result in adverse effects to subsistence use and resources of a lesser extent and magnitude than the current management activities. Some management actions, such as the establishment of SMAs would restrict land use activities and allow for the recovery of previously affected vegetation resources in localized areas, resulting in a beneficial effect. Adverse effects could be highlighted, and subsequently mitigated against through close coordination with subsistence users during the implementation planning phase of certain areas.

4.3.4.2.5 Alternative D for Subsistence

Lands and Realty Effects on Subsistence (Alternative D)

Acquisitions that may affect subsistence resources under Alternative D are the same as discussed under Alternative C, except the Neacola Mountains ACEC would not be identified as an avoidance area.

Withdrawals – ANCSA 17(d)(1) withdrawals would be recommended for revocation under this alternative. Previously withdrawn lands that were not selected by the State or Native corporations would then be available for consideration for disposal. Because of the constraints in place under these withdrawals, there would be an increased potential for resource development and potential subsistence resource-disturbing activities. The magnitude of increase would be minor, given underlying land selection status, and the limited mineral development potential of BLM-managed lands.

Leasable, Locatable, and Salable Minerals Effects on Subsistence (Alternative D)

The level of development potential, and overall effects on BLM-managed lands for leasable, locatable, and salable minerals would be similar to that in Alternative B. Projected mineral development would be limited in extent due to mineral potential (Appendix G), thereby maintaining current conditions for subsistence resources throughout the Ring of Fire planning area. The RFDs for minerals indicate that a total of 2,558 acres have potential for oil and gas disturbance (all ownerships, not just BLM), and less than 60 acres of BLM-managed lands have the potential for locatable mineral entry. It is unlikely that any salable mineral development would occur on BLM-managed lands. Similar to Alternative C, the Lake Carlanna Municipal Watershed and the Halibut Cove Forest Study Area would be closed to any potential leasable, locatable and salable mineral entry, in an effort to maintain the current conditions of subsistence resources in those areas.

Off-Highway Vehicles Effects on Subsistence (Alternative D)

Under Alternative D, OHV use on BLM-administered lands would be managed as described under Alternative C. Although all lands under this alternative would be designated as “limited” to OHV use, BLM may choose to open some portions of the three proposed SMAs to OHV use. OHV closures would remain at Campbell Tract, as would restrictions on OHV use on BLM parcels within the Chugach State Park (11 AAC 20.015 and 11 AAC 20.040). Limiting use within the Ring of Fire planning area may reduce adverse effects to subsistence resources relative to the current level of effects. Areas of high OHV use, such as the proposed Knik River SRMA, may have the highest level of beneficial effects on subsistence resources if use is limited, presuming that any area that might be designated for open OHV use in this area sufficiently guards against adverse effects. Limiting areas to OHV use could restrict areas available for subsistence hunting on lands currently in use for that purpose, reducing user access to open areas or areas accessible by other means. Close coordination with subsistence users could mitigate or reduce these effects. Subsistence resource habitat would be improved by reducing the number of braided trails, channeling users into fewer and more specific corridors, and initiating trail maintenance and improvement designed to reduce the damage caused by the activity to lands and waters of the planning area.

Recreation Effects on Subsistence (Alternative D)

Effects from recreation on subsistence resources under Alternative D are the same as discussed under Alternative C. BLM would manage SMAs to maintain their value to subsistence users in cooperation with adjacent landowners and land managers

Summary of Alternative D Effects on Subsistence

Effects to subsistence resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (less than 20 acres

per year) may cause adverse effects to subsistence, unless appropriately mitigated. Any possible effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance due to mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres total), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to subsistence use and resources. Some management actions, such as the establishment of SMAs may provide additional protections to subsistence resources and recovery for any previously affected resources, resulting in a beneficial effect. However, where recreational access increases, competition for subsistence resources may also increase. Available information described in the sections above indicates that the adoption of the management actions may result in adverse effects to subsistence use and resources of a lesser extent and magnitude than the current management activities. Some management actions, such as the establishment of SMAs would restrict land use activities and allow for the recovery of previously affected vegetation resources in localized areas, resulting in a beneficial effect. Adverse effects could be highlighted, and subsequently mitigated against, through close coordination with subsistence users during the implementation -planning phase of certain areas.

4.4 Cumulative Effects

4.4.1 Methods

The CEQ defines cumulative effects as:

> "The effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7)."

Cumulative effects are linked to incremental actions or policy changes that individually may have small outcomes, but that in aggregate with other factors, can result in greater effects to the environment of the Ring of Fire planning area. `The intent of the cumulative effects analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. The following cumulative effects assessment describes the additive and synergistic result of the actions proposed in this PRMP/FEIS as they interact with reasonably foreseeable future actions external to those proposed in the Ring of Fire PRMP/FEIS alternatives.

The goal of identifying potential cumulative effects is to provide for informed decisions that consider the total effects (direct, indirect, and cumulative) of alternative management actions. This section characterizes the incremental cumulative effects that potentially arise from external factors in combination with the direct and indirect effects. The potential for cumulative effects and their significance were evaluated for the resources and characteristics of the human environment described in Chapters 3 and 4.

The geographic and temporal scope of the cumulative effects analysis must be defined. For the Ring of Fire PRMP/FEIS, the temporal scope looks at reasonably foreseeable future actions and potential effects 15 years into the future, or through the year 2020. The geographic scope of analysis includes the Ring of Fire planning area, in that reasonably foreseeable future actions (RFFAs) throughout the planning area, not necessarily located on BLM-managed lands, are identified for review. However, the cumulative effects analysis is focused on BLM-managed lands and the adjacent zones in which direct and indirect effects of BLM-managed or permitted activities combine with effects of RFFAs to create additive or synergistic effects. Additive effects are repeated actions that may cause effects to build through simple addition. Synergistic effects result from the same or different actions that interact to produce cumulative effects greater than the sum of the effects. The analysis will not address actions, areas, and activities in parts of the planning area where there is no linkage to BLM-managed lands or effects of BLM-managed and permitted activities.

Because the PRMP/FEIS only provides a broad management framework, and specific actions or projects that may result from these management actions will be subject to additional NEPA compliance requirements, the analysis in this chapter estimates potential effects, based on known locations of developments or management actions. Effects are quantified based on available data.

RFFAs anticipated over the next 15 years on all lands in the Ring of Fire planning area, including private, State, Native corporation, and federal lands, have been considered in the analysis to the extent reasonable and possible. The best available information on location, timing, and magnitude of these actions has been utilized.

The following information is included in the cumulative effects analysis for each of the resources, resource uses, and other areas of BLM-management responsibility addressed by the Ring of Fire PRMP/FEIS:

- **Past and present effects** – these are past effects, such as the *Exxon Valdez* oil spill, that have influenced the current condition of the specific resource. They help describe the context of cumulative effects and the analysis of the contribution of BLM management actions to cumulative effects.
- **Summary of direct and indirect effects by alternative** – these effects are summarized for assessment of additive, incremental, and synergistic effects with the potential effects of specific RFFAs.
- **Summary of cumulative effects** – cumulative effects are evaluated by combining the direct and indirect effects associated with the alternative-specific management actions, with the external effects of RFFAs, and determining the significance of potential cumulative effects, and BLM's relative contribution to cumulative effects.

4.4.2 Reasonably Foreseeable Future Actions

RFFAs consist of projects, actions, or developments that can be projected, with a reasonable degree of confidence, to occur over the next 10 to 15 years and that will affect the same, or portions of the same resource evaluated for direct and indirect effects. In some cases, quantitative information is available on the characteristics of the RFFA. In most cases, project details have not advanced beyond the conceptual stage. Due to the widely scattered distribution of BLM-managed lands within the planning area, the identification of RFFAs was conducted on a broad, regional scale. The following RFFAs are categorized by type of event and planning region within the Ring of Fire planning area. Effects of these RFFAs on resources, resource uses, and other management responsibilities within the Ring of Fire planning area are discussed under the appropriate resource or management category in Section 4.4.

4.4.2.1 Climate Change

Climate change is both a RFFA that can result in additive and synergistic effects with BLM management actions in the Ring of Fire planning area, and can also be affected by management actions taken. Evidence is emerging that climate warming in Alaska can be linked to changes occurring in the structure and function of terrestrial ecosystems throughout the State. Since the 1950s, Alaska has warmed by an average of four degrees Fahrenheit (USEPA 2005). The assessment of the impacts of climate change is in its formative phase, and it is not yet possible to know with confidence the net impact of such change. However, observed changes include warming of permafrost throughout the State, the decrease in area of closed-basin lakes in southcentral Alaska, increased water temperature affecting anadromous fish habitat, and the altering of the ranges of some bird species. Climate change has also been linked to changes in disturbance regimes like fire and insect outbreaks in southcentral Alaska (McGuire 2003).

Development of oil and gas resources would produce some of the common greenhouse gases, primarily as a result of power requirements and fuel consumption, activities that produce CO. Because climate change must be viewed from a global perspective, the magnitude of the emissions potentially contributed by oil and gas activities in the planning area needs to be viewed in that context. The incremental contribution of greenhouse gases resultant from any of the alternatives in the Ring of Fire PRMP/FEIS would be minor when compared to total greenhouse gas contributions from sources outside of BLM actions in the planning area.

4.4.2.2 Forestry

Southeast Alaska Region

Timber Management – Several timber sales have been proposed within the Tongass National Forest (TNF) for 2005 requiring NEPA documentation. The majority of these timber sales are removed from large parcels of lands, though most sales are far removed from BLM-managed lands. The potential synergistic relationship to cumulative effects is limited to contributions to the regional economy. The TNF five-year timber sale plan, as amended March 24, 2006, indicates a proposed 760 million board feet (MMbf) to be sold in the time period up to and including 2010 (USFS 2006). This TNF plan is subject to various approvals and forthcoming decisions. As such, the sale plan is dynamic and the amount of timber harvested is neither definitive nor free from future change. Since most of these sales are far removed from BLM-managed lands, the

potential synergistic relationship to cumulative effects is limited to contributions to the regional economy.

4.4.2.3 Access, Transportation, Utility and Communication Corridors

Alaska Peninsula/Aleutian Chain Region

Cook Inlet to Bristol Bay Corridor – The Alaska Department of Transportation and Public Facilities (ADOT&PF) Southwest Alaska Transportation Plan proposes development of a surface transportation link between Cook Inlet and Bristol Bay. This roadway project would be constructed in segments, and would connect the communities of Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Naknek, and King Salmon to Cook Inlet, and would improve the transportation linkage to the Kenai Peninsula and Anchorage. Proposed segments in order of priority include: Williamsport-Pile Bay Road Improvements and Port Facility; Iliamna-Nondalton; Naknek-South Naknek; Pile Bay-Pedro Bay-Iliamna; Iliamna-Igiugig; Igiugig-Naknek; Dillingham-Aleknagik; Igiugig Road-Levelock Junction; Levelock-Aleknagik (ADOT&PF 2004f).

Currently, only the Williamsport-Pile Bay, Iliamna-Nondalton, Naknek-South Naknek; and Dillingham-Aleknagik segments are feasible within the next 20 years (ADOT&PF 2004f). Construction has already begun on the 15.5-mile Williamsport-Pile Bay Road Improvements and associated Iliamna River bridge replacement project. The Four Mile Creek, Timberline Creek, and Chanceless Creek bridges along the current Williamsport-Pile Bay road were upgraded in 2000 and 2002 (Denali Commission 2003). As of March 2005, ADOT&PF has requested assistance to begin baseline data collection for the Iliamna-Nondalton segment and associated Newhalen River bridge (State of Alaska 2005).

Smaller projects that would contribute to the Cook Inlet to Bristol Bay Corridor include the Chignik Connectors Project, and the Iniskin Bay-Williamsport Highway. ADOT&PF and HDR Alaska, Inc have begun collecting baseline data for the Chignik Connectors Project. This project would construct a 20- to 25- mile gravel road between the communities of Chignik, Chignik Lake, and Chignik Lagoon. The project is currently in the scoping phase (ADOT&PF 2004c). In conjunction with the Pebble Copper mining project, ADOT&PF is examining the feasibility of constructing a 75-mile road from the Pebble Copper mine site to a port site at Iniskin Bay or Williamsport. Draft reconnaissance engineering started in July 2004, and final reconnaissance engineering was completed in 2005 (ADOT&PF 2005b).

Southcentral Region

Cook Inlet to Bristol Bay Corridor – Refer to the discussion under the Alaska Peninsula/Aleutian Islands Region.

Knik Arm Crossing – In 2003, the Knik Arm Bridge and Toll Authority (KABATA) was formed to construct a bridge across the Knik Arm connecting the Municipality of Anchorage (MOA) to the Matanuska Susitna Borough (MSB). KABATA is currently working with the Federal Highways Administration (FHWA) to complete an EIS and the regulatory and design processes necessary to construct the project. The crossing would likely connect to the Glenn Highway in Anchorage, and in the Port MacKenzie District in the MSB. The Draft EIS is scheduled to be released to the public in the summer of 2006 and construction is estimated to be complete in 2010 (KABATA 2005).

Southeast Region

Gravina Access Project – The ADOT&PF and FHWA, with assistance from their contractor HDR Alaska, Inc., produced an EIS investigating alternatives for improving access between Revillagigedo Island and Gravina Island of southeast Alaska. The FHWA issued its Record of Decision (ROD) on the Final EIS for the Gravina Access Project on September 15, 2004. This identifies Alternative F-1, a combined 200-foot high/120-foot bridge crossing that incorporates Pennock Island, as the selected alternative (USDOT and FHWA 2004).

BLM properties lie less than one-mile north of the selected alternative corridor (Ketchikan Creek-Deer Mountain area) on Revillagigedo Island. BLM lands are also found in the Carlanna Lake area of Revillagigedo Island, northwest of the selected alternative (ADOT&PF and FHWA 2004).

Juneau Access Improvements Project – ADOT&PF proposes to construct a transportation corridor and/or improve marine ferry transportation between Juneau and Skagway. The approved action proposes a 50.5-mile highway from the end of Glacier Highway to Katzehin, and the construction of a marine ferry terminal at Katzehin outwash plain (ADOT&PF 2005a). Daily ferry shuttles would occur, servicing the communities of Haines and Skagway.

There is one Native-selected parcel of BLM land along the proposed alignment located between the Gilkey and Lace rivers of Berners Bay on the east side of Lynn Canal (ADOT&PF 2005a).

4.4.2.4 Locatable, Leasable and Salable Minerals

Alaska Peninsula/Aleutian Chain Region

Alaska Peninsula Oil and Gas Leasing Program – ADNR held the Alaska Peninsula Area Wide Oil and Gas Lease Sale in October 2005 (ADNR 2005g). The preliminary finding and proposed management consistency determination evaluates lands between Nushagak Bay along the northwest coast of the Alaska Peninsula southwest to the Cold Bay region. This includes the communities of Nelson Lagoon, Port Moller, Pilot Point, Ugashik, Egegik, King Salmon, and Naknek (ADNR 2005k). The Alaska Peninsula Areawide sale encompasses five million acres, of which only selected tracts that are State owned may be offered (ADNR 2005g). As a result of this oil and gas lease, two companies, Hewitt Minerals Corporation and Shell Offshore Inc., bid on and won tracts in the Aleutian East Borough totalling approximately 213,120 acres. Hewitt Mineral Corporation won four tracts for a total of $313,920 while Shell Offshore Inc. won 33 tracts for a total of $954,201.60.

Southcentral Region

Big Chunk Project – Liberty Star conducted a comprehensive exploration project to evaluate copper-gold deposits on State mining claims adjacent to the Pebble Copper Mine deposit (Alaska Minerals Commission 2005).

Cook Inlet Oil and Gas Leasing Program – On February 17, 2005, the ADNR Division of Oil and Gas held a competitive oil and gas leasing in the Cook Inlet Areawide 2005 Oil and Gas Lease Sale on May 18, 2005. This sale encompassed four million acres bordered by the Chugach and Kenai mountains in the east, the Aleutian Range to the west, the City of Houston to the north and Homer in the south. Approximately 55 tracts were sold, totalling nearly 250,000 acres, located in the vicinity of the communities of Anchorage, Kenai, Palmer, Wasilla, Houston,

Hope, Nikiski, Soldotna, Sterling, Ninilchik, Kasilof, Homer, Clam Gulch, Nikolaevsk, Anchor Point, Knik, Tyonek, and Salamtof (ADNR 2005i).

Susitna Basin Exploration License Area – In 2003, ADNR approved two oil and gas license areas in the MSB within the Yentna, Kahiltna, and Susitna river basins to Forest Oil Corporation. The combined area is 857,681 acres and is for a term of seven years, effective November 1, 2003 (ADNR 2005j).

Pebble Copper Mine Project – The Pebble gold-copper-molybdenum-silver deposit is located in the Lake and Peninsula Borough, just north of Frying Pan Lake and 18 miles northwest of Iliamna. In 2004, Northern Dynasty Minerals Ltd. began a $34.5 million program to collect engineering, environmental, and socio-economic data required for a Bankable Feasibility Study and submission of permit applications for the Pebble Copper Mine. The 2005 geological program in the east zone of the prospect identified a substantial addition to the mineral prospect. For 2006, a drilling program worth $18-20 million is planned, and feasibility and permit applications have been deferred until 2007. Design/Engineering was initially expected to begin early 2006 and end mid-2009. Construction was initially scheduled between mid-2008 to mid-2010 with production beginning late-2010 (Northern Dynasty Minerals Ltd. 2005). However, all of these milestones are set back while the east zone prospect is more fully explored.

Wishbone Hill Coal Field – The ADNR Division of Geological and Geophysical Surveys (DGGS) made a Preliminary Best Interest Finding on February 4, 2005, to lease 40 acres of the Wishbone Hill Coal Field near Sutton, Alaska, by competitive auction. The decision was made in response to an application by Sutton Partners LLC (Knoll Acres Associates, LLC) to obtain the rights to rejected coal tailings remaining from the previous Evan Jones coal washery located in the Wishbone Hill Coal Field. The DGGS determined that the 40 acres lease tract has high potential for coal development (ADNR 2005f).

Southeast Region

Kensington Gold Project – Coeur Alaska, Inc. acquired the Kensington and Jualin Mines in the 1990s and has received all permits to begin construction of a new mine facility. The construction should occur over an 18-month window with a 10-year expected life-of-mine (ADOT&PF 2005a). In 2004, the USFS issued a ROD for the Kensington Gold Project EIS which approves the following modifications to the 1997 Approved Plan of Operations (Alternative D): construction of a Tailings Storage Facility with discharge subject to the National Pollution Discharge Elimination System (NPDES), surface processing of ore located at mill facilities in the Johnson Creek drainage, and upgrade of the Kensington and Jualin Mine access roads (USFS 2004g).

4.4.2.5 Recreation Activities

Southcentral Region

Recreation and OHV Use on State and Borough Lands in the Knik River Valley – Significant recreation and OHV use occurs throughout the entire Knik River Valley. The MSB initiated planning activities for Borough-managed lands. In 2005, legislation was introduced to establish a State motorized recreation area within the Knik River Valley. As of early May 2006 this legislation, House Bill 307, passed both the Alaska House of Representatives and Senate, and is awaiting governor approval.

Heli-skiing – In 2004, the USFS issued a ROD and special use permit to Chugach Power Guides to conduct heli-skiing on the Glacier and Seward Ranger Districts. The selected alternative allows Chugach Power Guides to conduct a total of 2,200 client days in existing and new locations under a five-year special use permit. Operations are authorized for the following core-units: Glacier-Winner, West Twentymile, North Twentymile, East Twentymile, Placer-Skookum, East Bench Peak, North Bench Peak, West Bench Peak and Grandview, Mid Seattle Creek, East Seattle Creek, East Moose Creek, and Mount Ascension (USFS 2004e).

Southeast Region

Heli-skiing – Currently Out of Bounds Adventures, Inc. conducts outfitter-guided heli-skiing on the TNF in the Antler Glacier and Antler River Valley, Bucher Glacier, and the lower half of Taku Glacier, Chilkat Mountain Range south of the Endicott River Wilderness (USFS 2001b). Native-selected BLM parcels are located adjacent to or within the flight path of some of these tours.

In 2002, Out of Bounds Adventures, Inc. and Southeast Alaska Backcountry Adventure were granted a five-year SRP for BLM administered lands. Teton Gravity Research was granted a three-year permit for helicopter access to film skiers and snowboarders (BLM 2002c). Operations would occur on the Denver, Schubee, Meade, West Creek, Ferebee, Norse, Grand Canyon, Chilkat, and Bertha glaciers (BLM 2002d).

4.4.2.6 Other BLM Planning Activities

BLM is in the process of preparing or completing other RMPs for BLM-managed lands throughout the State of Alaska. These include the East Alaska PRMP/FEIS, and the Bay RMP/EIS (under preparation), both of which are adjacent to the Ring of Fire planning area, and the Kobuk-Seward Draft RMP/EIS, which is not adjacent to the Ring of Fire planning area. These are independent plans that follow the same planning procedures as the Ring of Fire PRMP/FEIS. BLM evaluates the specific resources within each of these different planning areas with regard to the requirements of the BLM Land Use Planning Handbook. Potential effects on each resource and resource use are evaluated within these RMP/EISs within the context of each planning area, and their intrinsic values and/or sensitivity to impacts.

These other BLM RMP/EISs are considered RFFAs that have the potential to interact with the Ring of Fire PRMP/FEIS and result in cumulative effects. Primary examples of interaction between plans would be with resources that cross planning boundaries, such as migratory fish, wildlife, and waterfowl. While physical resources such as air and water also cross planning boundaries, there are no activities or uses approved on BLM-managed lands in the Ring of Fire PRMP/FEIS that would result in synergistic effects on these resources in the other planning areas such as East Alaska or Bay. Resources uses, such as leasable, locatable, and salable minerals, OHVs, and recreation can also occur across planning boundaries. The location and limited development potential for mineral resources on BLM-managed lands within the Ring of Fire planning are not likely to result in cumulative effects in other planning areas. Areas with access and connection for OHV and recreation use between East Alaska and Ring of Fire does not exist due to the location and scattered nature of BLM-managed lands within Ring of Fire planning area. Management actions taken with regard to OHV use in the Knik River area could redirect use to other areas, including East Alaska, and will be addressed in the implementation-level plan for the Knik River SRMA.

There is a potential for synergistic effects between decisions made in the Bay Plan regarding mineral development in the vicinity of the Pebble Copper mine, and activity along the Iniskin River-Pile Bay Road. Fish, wildlife, and subsistence resources could experience some cumulative effects. However, the Draft Bay RMP/EIS has not been completed, and it is premature to reach any conclusions regarding potential cumulative effects between these plans.

4.4.3 Cumulative Effects for Resources

4.4.3.1 Soils

4.4.3.1.1 Past and Present Effects for Soils

Disturbances to Alaska Peninsula/Aleutian Chain and Kodiak regions' soil resources have resulted from natural forces such as climate, volcanic eruptions, from shoreline contamination by the *Exxon Valdez* oil spill, and from mining and transportation projects, construction of facilities, and military activities in site-specific areas. The Southcentral region is home to the most populous city in the State, Anchorage. This Southcentral region also houses the fastest growing area in the State of Alaska, the Matanuska Susitna Valley. The soils in and around these larger urban areas have been affected heavily by transportation projects, construction of facilities, and recreation-related activities (particularly OHV use). Timber harvest and wildland fires have likely affected the soil resources in other parts of the region. Soils in the Southeast region have been affected by transportation projects, construction of facilities, abundant timber harvest, and use of recreational trails.

4.3.4.1.2 Summary of Direct and Indirect Effects by Alternative for Soils

Alternative A – Current Management for Soils

The management actions proposed under Alternative A would likely have generally minor effects on soil resources in the Ring of Fire planning area due to the relatively low level of current activity associated with mineral development. Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. All of the proposed actions would maintain the effects to soil resources at their present levels (with an expected gradual increase due to rises in populations). Currently OHV use is undesignated on BLM lands, effectively making all BLM lands within the planning area unrestricted to OHV use. Within the Knik River Valley, there may be localized areas of moderate adverse effects due to compaction and erosion.

Alternative B – Resource Development for Soils

The management actions proposed under Alternative B would differ from Alternative A in that removal of ANCSA 17(d)(1) withdrawals would open additional lands to mineral entry, and all lands would be designated as "open" to OHV use. Timber harvests (approximately 20 acres per year) would cause localized adverse effects on soils from clearing and road building. Opening additional lands to mineral entry (up to 2,618 acres total) could increase exploration and development activities; however, the potential for additional development is low (Appendix G) and would be subject to ROPs and stipulations. Adverse effects on soil resources would be minor, and localized in nature. Effects from OHV use would be similar to those seen under Alternative A, which would be generally minor and short-term, with moderate adverse effects on soil resources seen within localized areas of the Knik River Flats.

Alternative C – Resource Conservation for Soils

The management actions proposed under Alternative C are directed towards resource conservation while continuing to allow for multiple use activities. ANCSA 17(d)(1) withdrawals would be maintained, and mineral exploration and development restrictions would be in place for specific sensitive or unique areas (Section 4.3.1.2.4). Timber harvests (approximately 20

acres per year) would cause localized adverse effects on soils from clearing and road building. The Knik River and Haines Block are identified as SRMAs, and the Neacola Mountains as an ACEC. Implementation plans would be developed for these areas. Under Alternative C, BLM would designate all lands as “limited” to existing roads and trails for OHV use. All of these activities would be beneficial to the soil resources located on BLM-managed lands by preventing degradation and compaction, relative to the current management actions.

The information discussed above indicates that implementation of management actions of Alternative C would result in fewer adverse effects on soil resources than under Alternatives A or B. Moreover, as a result of some management actions that would restrict land use activities in certain areas (e.g. designation of lands as SMAs), soil resources would likely benefit from implementation of Alternative C.

Alternative D – Proposed Action for Soils

The management actions proposed under Alternative D are directed towards resource conservation while continuing to allow for multiple use activities. ANCSA 17(d)(1) withdrawal orders would be revoked, although restrictions would be in place for certain sensitive or unique areas. Timber harvests (approximately 20 acres per year) and potential mineral development (up to 2,618 acres of total surface disturbance) would cause localized adverse effects on soils from clearing and road building. The Knik River and Haines Block are identified as SRMAs, and the Neacola Mountains as an ACEC. Implementation plans would be developed for these areas. Under Alternative D, BLM would designate all lands as “limited” to OHV use. All of these activities would be beneficial to the soil resources located on BLM-managed lands, relative to the current management actions.

The information discussed above, relative to Alternative D, indicates that implementation of management actions of this alternative would result in fewer adverse effects on soil resources than under Alternatives A or B. Moreover, as a result of some management actions that would restrict land use activities in certain areas (e.g. designation of lands as SMAs), soil resources would likely benefit from implementation of Alternative D. However, this alternative would implement fewer restrictions than Alternative C, resulting in both beneficial and adverse direct and indirect effects on soil resources.

4.3.4.1.3 Overall Cumulative Effects on Soils

Depending on scale and location, RFFAs related to climate change, timber sales, transportation projects, and exploration and development of leasable, locatable, and salable minerals will have the general potential to effect soil resources through compaction, contamination, erosion, loss of organic matter, and melting of permafrost where present, on BLM managed lands, and lands affected by indirect effects of BLM managed or permitted activities within the Ring of Fire planning area. Climate change is a major factor that may directly (drought or flooding) and indirectly (contributing to increased levels of wildfires) affect soil resources.

The aggregation of past and, present actions, and RFFAs, as well as those direct and indirect effects under all alternatives may continue to adversely affect soil resources on BLM managed and associated affected lands in the Ring of Fire planning area. The management actions that may adversely affect soil resources include, but are not limited to the following: forestry, exploration, development, and production of leasables, locatables, and salables, recreation; and OHV use, but actual level of potential impacts varies depending on a number scale and distance

from BLM lands. The broad differences between the alternatives are as follows: Alternative A would continue the current management practices employed by BLM; Alternative B would emphasize resource development (although such development would be low due to limited mineral development potential on BLM-managed lands), and continuation of unrestricted OHV use; Alternative C would emphasize resource conservation and special management activities in the Haines Block, Knik River, and Neacola Mountains; and Alternative D would result in both resource development and conservation on BLM-managed lands.

Given the relatively low level of forestry (approximately 20 acres annually on BLM-managed lands), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system), the contribution to cumulative effects on soil resources of RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of BLM-managed activities on a regional scale. Within specific localized areas such as the Knik River, the high OHV use on BLM-managed lands may combine with concentrated OHV use on neighboring lands in the Knik River valley, creating a moderate overall level of cumulative effects on soil resources in the area. This effect is somewhat mitigated by annually recurring natural forces such as flooding. In addition, Alternatives C and D would address BLM management contributions to adverse effects on soil resources in the Knik River area through future implementation planning for the SRMA.

4.4.3.2 Water Resources

4.4.3.2.1 Past and Present Actions for Water Resources

Disturbances to Alaska Peninsula/Aleutian Chain, and Kodiak regional watersheds have resulted from natural forces such as climate change, and from mining and transportation projects, construction of facilities, and military activities. Oil spills in the Alaskan coastal waters may have affected the water quality of tidally-influenced streams and rivers in the coastal watersheds (refer to Figures 3.2-8 and 3.2-9 for an illustration of the watersheds within this region).

The Southcentral region supports the largest human population in the State, and the surface waters in the larger urban areas have been affected regionally by climate change, and in site-specific areas, by transportation projects, construction of facilities, and recreation-related activities. Timber harvest and wildland fires have potentially affected the water resources in other parts of the region. Oil spills in the Alaskan coastal waters may have affected the water quality of tidally-influenced streams and rivers in the coastal watersheds (refer to Figure 3.2-10 for an illustration of the watersheds within this region).

In the Southeast region, watersheds have been affected by mining, transportation projects, construction of facilities, and timber harvest (refer to Figure 3.2-11 for an illustration of the watersheds within this region).

4.4.3.2.2 Summary of Direct and Indirect Effects by Alternative for Water Resources

Alternative A – Current Management for Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands where there is existing mineral development and intensive OHV use. Forestry activity, of less than 20 acres per year, may cause sedimentation and other degradation of water quality, unless appropriately mitigated by setbacks from water bodies. Any possible effects from hazardous materials, renewable energy, and recreation would be minimal, and would likely not extend to the regional level. Any disturbance due to mining, oil and gas, and associated road development would likely be limited in extent given the low potential for mineral development (up to 2,618 acres total); and potential adverse effects on water resources would be minor. Adverse effects may result from locatable and salable material mining, if any such mining is undertaken however, these effects would likely only occur on less than one percent of lands within the Ring of Fire planning area. As OHV use remains unrestricted, some short-term adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality may continue in heavy use areas, such as the Knik River Flats clear water streams.

Alternative B – Resource Development for Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands along the road network, areas with existing mineral development activity, or higher mineral potential, and in areas of concentrated OHV use. Effects from forestry, ROWs, mining, oil and gas would likely be limited in extent; consequently only a small portion of the waters that occur in BLM-managed

lands may be affected. OHV use would be designated as open, contributing to short-term adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality in heavy use areas, such as the Knik River valley clear water streams. Overall, effects to water resources under Alternative B would mainly occur on a local scale.

Alternative C – Resource Conservation for Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative C are likely to be limited in scale, and concentrated in specific areas. Effects on water resources from forestry (approximately 20 acres per year), establishment of ROWs, mining, oil and gas (up to 2,618 acres total) would be minor, due to avoidance areas, low potential for mineral development, and retention of ANCSA 17(d)(1) withdrawals. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. Some management actions, such as establishment of SMAs may restrict land use activities within these specific areas, and allow for the protection and recovery of any previously affected water resources. Thus while Alternative C may result in as many, or nearly as many effects to water from development activities (fluid mineral, locatable mineral, salable mineral, and forestry) as Alternative B, limitations on OHV use in some areas could reduce effects to water resources generally (and especially to Knik River tributaries).

Alternative D – Proposed Action for Water Resources

Effects to water quantity, drainage patterns, and water quality from future management under Alternative D are likely to be limited in scale, concentrated in specific areas, and minor in magnitude. Opening additional lands to mineral entry through revocation of ANCSA 17(d)(1) withdrawals could increase exploration activities; however given the small number of acres designated as having high mineral development potential on BLM-managed lands, effects would be minor, and would be subject to ROPs and/or stipulations. Potential effects from these actions would be minor. Effects from forestry (approximately 20 acres per year), and the establishment of ROWs would likely be limited in extent; consequently only a small portion of the waters that occur in BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to water resources through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. The establishment of three SMAs may restrict land use activities within these specific areas, potentially benefiting water resources. Thus while Alternative D may result in a similar level of effects to water from development activities (fluid mineral, locatable mineral, salable mineral, and forestry) as Alternative B, limitations on OHV use in some areas could reduce effects to water generally (and especially to Knik River tributaries) and establishment of SMAs could protect and allow for recovery of previously affected water resources. The establishment of SMAs and restrictions on OHV use, leasable, locatable and salable mineral development would provide further protection and allow for recovery of previously affected water resources to a greater extent than Alternatives A or B.

4.4.3.2.3 Overall Cumulative Effects on Water Resources

Past and present actions that have affected water resources throughout the Ring of Fire planning area have included climate change, volcanic eruptions, mining and oil and gas development activities, transportation projects, construction of facilities, and timber harvesting, and would be the same for all alternatives. Climate change could affect the level of rainfall and glacial melt, with associated increased levels of river sediment. Oil spills in Alaskan coastal waters may have affected the water quality of streams and rivers in the coastal watersheds. Future reasonably foreseeable development activities associated with transportation projects and mineral exploration may have adverse effects on drainage patterns and water quality, although this would depend upon the location and area of activity. The effects of road construction on water resources in currently urbanized areas may increase the already altered drainage patterns and continue to introduce pollutants through runoff. Multiple mineral exploration and development activities rarely occur over the same area; however, multiple activities within a watershed are possible on the Alaska Peninsula, and can substantially decrease water supply in local aquifers, alter drainage patterns, and degrade the water quality in receiving waters.

In terms of direct and indirect effects, management actions proposed would vary by alternative, with Alternatives C and D providing some additional benefits related to water quality and alterations in drainage patterns through development of ROPs and stipulations (Appendix D), limitations on OHV use, and implementation planning in three specific areas. However, given the relatively low level of forestry (approximately 20 acres annually on BLM-managed lands), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system) on BLM-managed lands within the planning area, the contribution to cumulative effects on water resources from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of BLM-managed activities on a regional scale Within specific localized areas such as the Knik River, the high OHV use on BLM-managed lands may combine with concentrated OHV use on neighboring lands in the Knik River valley, creating a moderate overall level of cumulative effects on clearwater streams in the area. Implementation planning under Alternatives C and D would help to reduce cumulative effects.

4.4.3.3 Fisheries and Aquatic Habitat

4.4.3.3.1 Past and Present Effects for Fisheries and Aquatic Habitat

Increases in urban and suburban development, timber and mineral development, oil and gas exploration and development, transportation projects, oil spills (such as the *Exxon Valdez*), and fish harvest (subsistence and, recreational) have had site-specific adverse effects on fisheries and aquatic habitat for both anadromous and resident freshwater species within the Ring of Fire planning area. Effects include loss of riparian and spawning habitat, impediments to fish migration, and deterioration of water quality. In some cases, such as the *Exxon Valdez* oil spill, effects have been severe in specific areas, but have not resulted in long-term regional effects to BLM-managed resources. Additionally, the designations of critical habitats and National Wildlife Refuges (NWR) on BLM lands (most beginning in the 1970s), and additional protection to fish habitat that designation provides have had a beneficial effect on the conservation of fish species and their habitat. However, the amount of critical habitat currently designated and that overlaps with BLM-managed lands is quite limited. Furthermore, although compliance with Section 7 may result in some limits on development activities, the scope of limits that may be required is dependent upon the purpose and function of the critical habitat, and the development related action resulting in adverse destruction or modification.

4.4.3.3.2 Summary of Direct and Indirect Effects by Alternative for Fisheries and Aquatic Habitat

Alternative A – Current Management for Fisheries and Aquatic Habitat

Effects to fish habitat from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands. Areas with potential for mineral development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, making potential effects on fish and fish habitat minimal, and localized in scale. General adverse recreation effects would be felt on a minimal localized scale. Acquisition of land from willing landowners, particularly when they occur along riparian areas, can have a beneficial effect on fish habitat by preventing development of private land and providing consistent habitat management. The unrestricted OHV use, especially in high-use areas such as the Knik River Valley, may cause changes in stream morphology and increased levels of pollution. Overall, minimal adverse effects to fish habitat under Alternative A may occur on the local scale.

Alternative B – Resource Development for Fisheries and Aquatic Habitat

Effects on fish habitat from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and would be similar to Alternative A. With the relinquishment of ANCSA 17(d)(1) withdrawals, mineral exploration could increase. However, areas with potential for mineral disturbance due to mining and oil and gas exploration and development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, and potential effects on fish and fish habitat would be minor. Timber harvests would continue at approximately 20 acres per year. General adverse recreation effects would be felt on a minimal, localized scale. Acquisitions, particularly when they occur along riparian areas, can have a beneficial effect on fish habitat by preventing development of private land and providing consistent habitat management. Designating the entire planning area as “open” to OHV use may continue to cause changes in stream morphology and increased levels of

pollution in high use areas such as the Knik River drainage. Overall, minimal adverse effects to fish habitat under Alternative B may occur on the local scale.

Alternative C – Resource Conservation for Fisheries and Aquatic Habitat

Effects to fish habitat from future management under Alternative C would be similar to Alternative A, and are likely to be limited in scale, or concentrated in specific areas. Effects from forestry (approximately 20 acres per year), ROWs, and mineral disturbance due to mining and oil and gas exploration and development(up to 2,618 acres total) would likely be minor due to the avoidance areas identified under this alternative, low potential for mineral development, and retention of ANCSA 17(d)(1) withdrawals. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to fish habitat through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection of fish habitat, resulting in a beneficial effect.

Alternative D – Proposed Action for Fisheries and Aquatic Habitat

Effects to fish habitat from future management under Alternative D are likely to be limited in scale, concentrated in specific areas, and minor in magnitude. Opening additional lands to mineral entry could increase exploration activities; however the potential for additional development is low and represents less than one percent of BLM-managed lands within the planning area. Effects from forestry (approximately 20 acres per year), ROWs, mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres total) would likely be limited; consequently only small portions of BLM-managed lands may see minor effects to fish habitat. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to fish habitat through changes in water quantity, alterations in drainage patterns and degradation of water quality, especially in heavy use areas, such as the Knik River SRMA. The establishment of SMAs may restrict land use activities within these specific areas, potentially benefiting fish and fish habitat.

4.4.3.3.3 Overall Cumulative Effects on Fisheries and Aquatic Habitat

Past and present actions that have affected fisheries and fish habitat throughout the Ring of Fire planning area have included natural forces such as climate change and volcanic eruptions, mining activities, transportation projects, construction of facilities, and timber harvesting, and would be the same for all alternatives. Oil spills in Alaskan coastal waters may have affected the water quality of streams and rivers in the coastal watersheds. Adverse effects have included the loss of riparian and spawning habitat, impediments to fish migration, and deterioration of water quality. Reasonably foreseeable future development activities associated with transportation projects and mineral exploration may have adverse effects on drainage patterns and water quality, although this would depend upon the location and area of activity. There are several proposed timber sales within the Southeast region and a mining project on the Alaska Peninsula, where activities may adversely affect fish and fish habitat through increased runoff and sedimentation.

In terms of direct and indirect effects, management actions proposed would vary by alternative, with Alternatives C and D providing some slightly greater benefits related to fish and fish habitat than Alternatives A and B, including the minimization of habitat and water quality degradation

through the development of ROPs and stipulations (Appendix D) that would be applied to development activities, limitations on OHV use, and future implementation planning in three specific areas. However, given the relatively low level of forestry (approximately 20 acres annually on BLM-managed land), mineral disturbance due to mining and oil and gas exploration and development (approximately 2,618 acres, or less than one percent of BLM-managed lands), and recreation use on BLM-managed lands, the contribution to cumulative effects on fish and fish habitat from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities, far outweighs the contribution of proposed management actions on a regional scale. Within specific localized areas such as the Knik River, the high OHV use on BLM-managed lands may combine with concentrated OHV use on neighboring lands in the Knik River valley, creating a moderate overall level of cumulative effects on fish habitat in the area. Implementation planning proposed under Alternatives C and D would help reduce cumulative effects in those locations.

4.4.3.4 Wildlife Resources

4.4.3.4.1 Past and Present Effects for Wildlife

Baseline information on wildlife in the Ring of Fire planning area is summarized in Section 3.2.9, including past and present events and activities that have substantial effects on the populations of BLM sensitive species and popular game species. Activities include increases in urban and suburban development, timber and mineral development, transportation projects, oil spills, and wildlife harvest (subsistence, recreational), which have had site-specific adverse effects through loss and fragmentation of habitat, disturbance, and impediments to migration routes.

In some cases, such as the Exxon Valdez oil spill, effects have been severe in specific areas, but have not resulted in significant long-term regional effects to BLM-managed resources. Additionally, the designations of critical habitats and NWRs (most beginning in the 1970s), have had a beneficial effect on the conservation of wildlife species and their habitats. However, the amount of protected habitat that overlaps with BLM-managed lands is quite limited. Although compliance with Section 7 may result in some limits on development activities, the scope of limits that may be required is dependent upon the purpose and function of the critical habitat, and the development-related action, resulting in destruction or modification.

4.4.3.4.2 Summary of Direct and Indirect Effects by Alternative for Wildlife

Alternative A – Current Management for Wildlife

The management actions proposed under the various management categories of Alternative A would maintain the effects to the wildlife resources at their current levels. Areas with potential for mineral development represent less than one percent of BLM-managed lands within the Ring of Fire planning area, and potential effects on wildlife and wildlife habitat would be minor. However, as OHV use remains unrestricted, moderate adverse effects to BLM-managed habitat, through loss of habitat and disturbance, could continue in high use areas such as the Knik River Flats. Minimal forestry activity (approximately 20 acres per year) and recreational activities along the road system may cause minor adverse effects to wildlife, but on an extremely local scale.

Alternative B – Resource Development for Wildlife

The management actions proposed under the various management categories of Alternative B would maintain the effects to the wildlife resources at their current levels. Designating all lands as “open” to OHV use may continue adverse effects to BLM-managed habitat in high use areas such as the Knik River drainage, through loss of habitat and disturbance. Boundaries of BLM-managed lands in relation to critical habitats should receive careful scrutiny before land transfers are approved. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to wildlife, but on an extremely local scale. With the revocation of ANCSA 17(d)(1) withdrawals, mineral exploration could increase; however areas that could be disturbed through mineral mining and oil and gas exploration and development represent less than one percent (2,618 acres) of BLM-managed lands within the Ring of Fire planning area. Potential effects on wildlife and habitat would generally be minor; however, unrestricted OHV use would continue to affect wildlife in specific areas such as the Knik River Valley. Only a small portion of the wildlife species found on BLM-managed lands could be adversely affected through loss of habitat and disturbance.

Alternative C – Resource Conservation for Wildlife

Effects to wildlife from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to wildlife, but on an extremely local scale. Any disturbance due to mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres), so consequently only a small portion of the wildlife species found on BLM-managed lands could be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation or habitat. Management actions, such as the establishment of SMAs, may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wildlife species or habitats, resulting in beneficial effects. The two SRMAs, primarily the Haines Block, would be managed to avoid adverse effects on wildlife resources.

Alternative D – Proposed Action for Wildlife

Effects to wildlife from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to wildlife, but on an extremely local scale and minor in magnitude. Any disturbance due to mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres), so consequently only a small portion of the wildlife species found on BLM-managed lands could be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Management actions, such as the establishment of SMAs, may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wildlife species or habitats, resulting in beneficial effects. The two SRMAs, primarily the Haines Block, would be managed to avoid adverse effects on wildlife resources.

4.4.3.4.3 Overall Cumulative Effects on Wildlife

Depending on scale and location, the combination of past, present, direct, indirect, and RFFA effects under all alternatives may continue to adversely affect wildlife resources. In particular, reasonably foreseeable timber harvest, mining, and transportation projects may result in site-specific loss or fragmentation of habitat, disturbance of wildlife species, and impediments to migratory patterns. Climate change and related changes to habitat may also affect the distribution and abundance of specific wildlife populations on a long-term basis. Given the scattered and unconsolidated nature of BLM lands, the relatively low level of forestry (approximately 20 acres annually on BLM-managed lands), mineral disturbance due to mining and oil and gas exploration and development (2,618 acres, or less than one percent of BLM-managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system), the relative contribution from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities, far outweighs the contribution of proposed management actions on a regional scale. There would be continued adverse effects of a currently unspecified magnitude from recreation activities, such as commercial helicopter tours on State-selected BLM lands, State lands, and USFS lands in the Haines area. In this region, commercial recreation permits from BLM may already contribute a larger proportion of impacts than activities by other managers. Another important instance of effects is the concentrated OHV use on BLM-managed lands and neighboring lands in the Knik River Valley. Under Alternatives C and D, the creation of the two SRMAs would contribute to beneficial cumulative effects in resolving use conflicts associated with OHVs (Knik River) and commercial

recreation helicopter tours (Haines Block). The estimated level of exploration, development and production of leasables minerals for all lands in the planning area (2,558 acres) is extremely small and unlikely to impact wildlife resource beyond localized areas. Less information is available to quantify potential disturbances on all lands in the planning area from locatable and salable mineral development, forestry, and other land use activities. The potential transportation corridor to Iniskin Bay, associated with the Pebble Mine may have localized effects on wildlife near the alignment.

4.4.3.5 Vegetation Resources

4.4.3.5.1 Past and Present Effects for Vegetation

Disturbances within the Alaska Peninsula/Aleutian Chain and Kodiak Island regions alpine tundra communities have resulted from community developments, military activities, cattle and reindeer grazing, fox farms and subsistence hunting. Mining activities require the removal of vegetation in the immediate vicinity of the claim, and may affect adjacent vegetation through edge effects or water quality issues. Access roads, utility corridors and electronic sites also require the removal of vegetation in the area of the footprint, and may stress adjacent vegetation by altering the surface and shallow subsurface flow of water.

Within the Southcentral region, climate change, bark beetle infestations, fire management, timber harvests, military activity, OHV use, and urban and suburban development have all contributed to changes in vegetation. Climate change, timber harvests, and mining activities have been sources of past and present effects on vegetation in southeast Alaska.

4.4.3.5.2 Summary of Direct and Indirect Effects by Alternative for Vegetation

Alternative A – Current Management for Vegetation

The current management actions under the Alternative A would maintain the effects to the vegetation resources at current levels. As OHV use continues to go unrestricted, adverse effects to BLM-managed vegetation resources through direct loss of habitat and the loss of habitat functions and values could continue, and result in moderate effects in areas of high use such as the Knik River valley. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation in localized areas. Any possible effects from renewable energy, recreation, or wildland fire and fuel management would be minimal, and would likely not extend to the regional level. Any disturbance due to mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the vegetation found on BLM-managed lands may be affected, and effects would be minor in magnitude.

Alternative B – Resource Development for Vegetation

The management actions proposed under the various management categories of Alternative B would result in effects on vegetation similar to Alternative A. Potential adverse effects from forestry (approximately 20 acres per year), renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. With the revocation of ANCSA 17(d)(1) withdrawals, mineral exploration could increase; however, areas with potential for disturbance from mineral and oil and gas development represent 2,618 acres, or less than one percent of BLM-managed lands within the Ring of Fire planning area. Consequently, only a small portion of the vegetation found on BLM-managed lands could be affected. Designating the planning area as “open” to OHV use would continue to create adverse effects to BLM-managed vegetation resources, similar to the current undesignated status, through direct loss of habitat and the loss of habitat functions and values. Adverse effects would generally be localized and minor in nature, except in high use areas such as the Knik River where moderate adverse effects to vegetation could occur.

Alternative C – Resource Conservation for Vegetation

Effects to vegetation from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation, unless appropriately mitigated. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the vegetation found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Some management actions, such as WSR designations and establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected vegetation resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative C may result in adverse effects to vegetation resources of a lesser extent and magnitude than Alternatives A, B, or D.

Alternative D – Proposed Action for Vegetation

Under Alternative D, adverse effects to vegetation from future management are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to vegetation. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (less than 2,618 acres); consequently only a small portion of the vegetation found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to vegetation. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected vegetation resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative D may result in adverse effects to vegetation resources of a lesser extent and magnitude than the current management activities.

4.4.3.5.3 Overall Cumulative Effects on Vegetation

Depending on scale and location, the combination of past and present actions, RFFAs, and direct and indirect effects considered under all alternatives may continue to adversely affect vegetation resources. In particular, climate change, timber harvesting, and mining projects would result in alteration of vegetation composition, removal of vegetation, and the availability and flow of surface water and groundwater. Although some management measures under all the alternatives may minimize or mitigate adverse effects on the vegetation resources of BLM-managed lands, continued adverse effects from recreation activities and OHV use, exploration, development and production of leasables, locatables, and salables, and other land use activities would likely offset mitigation to some degree. Alternatives C and D provide additional mitigation related to vegetation through development of ROPs and stipulations (Appendix D), limitations to OHV use, and future implementation planning in three specific areas. In addition to the direct and indirect effects of the proposed alternatives, economists predict that Alaska's population may continue to grow, likely increasing pressure on those BLM-managed lands within the public domain. Should current transportation plans discussed in Section 4.4.2 proceed as scheduled,

access to BLM-managed lands may also increase, along with increased pressure to utilize the surface and subsurface resources. Oil and gas leasing through the Cook Inlet and Alaska Peninsula Area Wide Oil and Gas Lease Sales may also increase construction of access roads, exploration, development, and production activities on lands adjacent to BLM.

The combination of past, present, direct, indirect, and RFFA effects under all alternatives may continue to adversely affect vegetation resources. Given the scattered and unconsolidated nature of BLM lands, the relatively low level of forestry (approximately 20 acres annually on BLM-managed lands), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system), the relative contribution of activities on BLM-managed lands to cumulative effects on vegetation would generally be minimal. The contribution to cumulative effects on vegetation from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of BLM-managed activities on a regional scale. Within specific, localized areas such as the Knik River, the level of OHV use on BLM-managed lands has a moderate contribution to cumulative effects on vegetation in the area. Future implementation planning proposed under Alternatives C and D would help reduce cumulative effects.

4.4.3.6 Wetlands-Riparian Resources

4.4.3.6.1 Past and Present Effects for Wetlands-Riparian

Disturbances to wetlands and riparian resources have resulted from climate change; commercial, industrial, and residential development; marine facilities; transportation facilities; and peat mining. These activities have resulted in localized vegetation changes, alteration of wetland hydrology, soil erosion, eutrophication of lakes, and the loss of wildlife habitat and ecological diversity throughout the Ring of Fire planning area. Regional changes to wetland and riparian vegetation is greatest in areas where urban development has expanded, such as the MOA, the Palmer-Wasilla area of the MSB, and the Kenai-Soldotna area of the Kenai Peninsula Borough.

4.4.3.6.2 Summary of Direct and Indirect Effects by Alternative for Wetlands-Riparian

Alternative A – Current Management for Wetlands-Riparian

The current management actions under Alternative A would maintain the effects to the wetland and riparian resources at current levels (although an increase would be expected with an increase in population). However, as BLM continues to allow OHV use and other recreational activities to go unrestricted, adverse effects to BLM-managed wetland and riparian resources through direct loss of habitat and the loss of habitat functions and values could continue. Any possible effects from renewable energy, recreation, or wildland fire and fuels management would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetlands and riparian resources found on BLM-managed lands may be affected. Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A would continue to adversely affect wetland and riparian resources in localized areas where development and managed activities are occurring.

Alternative B – Resource Development for Wetlands-Riparian

The management actions proposed under the various management categories of Alternative B would maintain the effects to the wetland and riparian resources at levels similar to Alternative A (although an increase would be expected with an increase in population). However, as OHV use continues to go unrestricted, adverse effects to BLM-managed wetland resources through direct loss of habitat and the loss of habitat functions and values could continue. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetlands and riparian resources found on BLM-managed lands may be affected.

Alternative C – Resource Conservation for Wetlands-Riparian

Effects to wetland and riparian resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of

the wetland and riparian resources found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to wetlands. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wetland and riparian resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative C may result in adverse effects to wetland resources of a lesser extent and magnitude than the current management activities.

Alternative D – Proposed Action for Wetlands-Riparian

Under Alternative D, effects to wetland and riparian resources from future management are likely to be limited in scale, or concentrated in specific areas. Any possible effects from renewable energy, recreation, or fire would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less); consequently only a small portion of the wetland and riparian resources found on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to wetland and riparian resources. Some management actions, such as the establishment of SMAs may restrict land use activities within these specific areas, and allow for additional protection and recovery of any previously affected wetland and riparian resources in localized areas. Available information described in the sections above indicate that the adoption of the management actions as described under Alternative D may result in adverse effects to wetland and riparian resources of a lesser extent and magnitude than the current management activities.

4.4.3.6.3 Overall Cumulative Effects on Wetlands-Riparian

Depending on scale and location, the combination of past, present, and RFFAs under all alternatives may continue to adversely affect wetland and riparian resources. In particular, climate change, timber harvesting, and mining projects would result in alteration of vegetation composition, removal of vegetation, and the availability and flow of surface and groundwater. Although some management measures under all the alternatives may minimize or mitigate adverse effects on the wetland and riparian resources of BLM-managed lands, continued adverse effects from recreation activities and OHV use, exploration, development and production of leasables, locatables, and salables, and other land use activities would likely offset mitigation to some degree. Site-specific activities, such as mineral exploration or commercial recreation, would require implementation plans that evaluate the environmental consequences of proposed activities, or a special permitting process. In addition to the direct and indirect effects of the proposed alternatives, economists predict that Alaska's population may continue to grow, likely increasing pressure on those BLM-managed lands within the public domain. All of these ongoing and proposed activities are likely to continue to adversely affect wetland and riparian resources within the Ring of Fire planning area, but on a localized scale, and in a more limited degree on BLM managed lands, and neighboring lands associated with BLM indirect effects. Most (greater than 98 percent) of BLM wetlands and riparian lands are in pristine condition. BLM is currently assessing the condition of these areas and emphasizing restoration of those found to be in impaired condition. All surface disturbing activities that would affect wetlands would be regulated by the United States Environmental Protection Agency (USEPA) and the United States Army Corps of Engineers (USACE).

4.4.3.7 Visual Resources

4.4.3.7.1 Past and Present Effects for Visual

Visual resources throughout the Ring of Fire planning area are affected annually by new developments associated with population growth, even though these effects are not always obvious to the casual observer. Within the Alaska Peninsula/Aleutian Chain region, military activities, mining activities, and the construction of access roads and utility corridors have all had localized effects on specific areas of the visual landscape. In the Kodiak Region, changes have resulted largely from community and military developments along the road system. In the Southcentral region, disturbances to visual resources have resulted from commercial, industrial, and residential development, the development of marine and transportation facilities (primarily along the road system), and from unrestricted recreational OHV use in high use areas such as the Knik River Valley. Disturbances to the visual resources of the Southeast region have resulted primarily from timber harvests and commercial, industrial, and residential development in the vicinity of existing communities. In general, given the scattered and unconsolidated nature of BLM-managed lands, adverse effects have been localized and minimal on a regional scale.

4.4.3.7.2 Summary of Direct and Indirect Effects by Alternative for Visual

Alternative A – Current Management for Visual

The management actions proposed under Alternative A would have a variety of effects on visual resources occurring on BLM-managed lands. Management would maintain any effects on visual resources at their current expected levels, given that current management does not establish VRM classifications. As OHV use continues to go unrestricted, minimal adverse effects to BLM-managed visual resources may continue, primarily in areas of high use such as the Knik River. Mineral and oil and gas exploration and development, and the creation of new ROWs both have the potential to adversely affect visual resources, however any effects would likely be minimal based on the limited potential for disturbance due to mining and oil and gas exploration and development on BLM-managed lands within the planning area (2,618 acres or less). Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A may have localized, adverse effects on visual resources.

Alternative B – Resource Development for Visual

Effects on visual resources use from management proposed under Alternative B would primarily be limited to a small portion of BLM-managed lands. All lands under Alternative B would be managed as VRM Class IV, which would allow actions that make major modifications to the existing character of the landscape (Figures 2.4-1 through 2.4-4). OHV use would continue to be undesignated on all lands within the Ring of Fire planning area, and may create changes in the existing landscape character and access to visual resources. Effects from forestry, ROWs, mining, and mineral disturbance due to mining and oil and gas exploration and development would likely be limited in extent; consequently only a small portion of recreation use on BLM-managed lands may be affected (2,618 acres or less). Stipulations or ROPs associated with mineral exploration and development may contain protections for visual resources in specific locations. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative B would have minimal effects on visual

resources, and effects would be on a very localized scale, primarily in high OHV use areas, such as the Knik River.

Alternative C – Resource Conservation for Visual

Effects to visual resources from management proposed under Alternative C are likely to be limited in scale, or concentrated in specific areas. The Neacola Mountains ACEC, the Halibut Cove Forest Study Area (Figure 2.4-5), and the Lake Carlanna Municipal Watershed (Figure 2.4-6) would be designated as VRM Class II. Changes in the existing landscape for these areas would be low and not attract attention. BLM-managed lands within the remainder of the planning area would be designated as VRM Class III. All lands within the Ring of Fire planning area would be designated as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the visual setting in high OHV-use areas such as the Knik River SRMA. Effects from forestry (approximately 20 acres per year), ROWs, mining, oil and gas would likely be limited in extent; consequently only a small portion of visual resources on BLM-managed lands may be affected, and those effects would be minimal. Resources would receive further levels of protection through the development of implementation plans in the three proposed SMAs, and would be managed to meet their outlined objectives (Appendix F). Fourteen river segments were identified as eligible, but not suitable for WSR designation. ORVs associated the scenic values of these river segments would be taken into consideration when evaluating proposed actions in these areas. The majority of these actions would minimize or mitigate adverse effects on visual resources through increased protections and regulation efforts. Actions that may adversely affect the visual landscape would only occur on a small portion of BLM-managed lands.

Alternative D – Proposed Action for Visual

Effects to visual resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas, such as the proposed SMAs. The Lake Carlanna Municipal Watershed (Figure 2.4-9) and the Halibut Cove Forest Study Area (Figure 2.4-8) would be managed as VRM Class II, where changes to the landscape character should be low, and not readily visible to the casual observer. The Neacola Mountains ACEC would be designated as VRM Class II as well. The remainder of BLM-managed lands within the planning area would be designated as VRM Class IV, which generally allows major modifications to the existing character of the landscape. BLM would designate all lands as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the visual landscape in high OHV-use areas, such as the proposed Knik River SRMA. Effects from forestry, ROWs, mining, and mineral disturbance due to mining and oil and gas exploration and development would likely be limited in extent (2,618 acres or less); consequently only a small portion of visual resources on BLM-managed lands may be affected. Resources would receive further levels of protection through the development of implementation plans in the three SMAs, and would be managed to meet the objectives of the specific SMAs (Appendix F). The majority of these actions would have beneficial effects on visual resources through increased protections and regulation efforts. Actions that may adversely affect the visual landscape would only occur on a small portion of BLM-managed lands.

4.4.3.7.3 Overall Cumulative Effects on Visual

Past alterations to visual resources in each of the four regions have resulted from community or military development, commercial or industrial developments, military activities, mining and oil and gas activities, the development of marine and transportation facilities, unrestricted recreational OHV use, timber harvests, or the construction of access roads and utility corridors.

The primary differences between direct and indirect effects of the alternatives are the designation of VRM Classes, management of OHV use, and designation of SMAs where management of visual resources would be further refined. Alternatives C and D provide some additional mitigation related to visual resources through the development of ROPs and stipulations (Appendix D), limitations to OHV use, and future implementation planning in three specific areas designated as SMAs. However, given the relatively low level of forestry (20 acres annually on BLM-managed lands), mineral and oil and gas disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system), the contribution to cumulative effects on visual resources from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of BLM management actions on a regional scale. Within specific, localized areas such as the Knik River, the level of high OHV use has had a moderate contribution to cumulative effects on visual resources. Future implementation planning under Alternatives C and D would help reduce BLM management action contributions to cumulative effects.

There are several different RFFAs proposed for the Ring of Fire planning area that may all contribute to adverse cumulative effects on visual resources unless mitigated in their planning efforts (Section 4.4.2 for detailed descriptions). Naturally occurring events, such as volcanic eruptions, earthquakes, landslides, avalanches, wildland fires, or floods, may lead to changes in the existing visual resources, as could development resulting from population growth. In general, construction of access roads, gravel pads, and facilities may alter the visual landscape and access to important viewpoints. Roads and highway projects may also have an adverse affect on visual resources of the region by altering basic visual elements of form, line, color, and texture. Increases in commercial recreation would allow increased visitor access to new viewpoints. The effects of RFFAs on BLM-managed lands would vary with respect to location, duration, extent, and magnitude throughout the Ring of Fire planning area.

4.4.3.8 Paleontological Resources

4.4.3.8.1 Past and Present Actions for Paleontological Resources

Disturbances to paleontological resources in specific areas have resulted from mining and oil and gas projects, transportation projects, construction of facilities, and military activities along the road system. Timber harvest and wildland fires have potentially affected paleontological resources in specific areas as well.

4.4.3.8.2 Summary of Direct and Indirect Effects by Alternative for Paleontological Resources

Alternative A – Current Management for Paleontological Resources

Effects to paleontological resources from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so the chance that any known paleontological resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations on a case-by-case basis. As OHV use remains unrestricted, adverse effects to paleontological resources could result through damage to surface features, especially in heavy use areas, such as the Knik River. Adverse effects from forestry and recreation use would likely be to small acreages.

Alternative B – Resource Development for Paleontological Resources

Effects to paleontological resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. Adverse effects from forestry (potentially on approximately 20 acres per year) and recreation use would likely be to small acreages and minor in scale. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, the RFDs (Appendix G) for oil and gas development, predict a total of 2,558 acres of potential disturbance. Up to 60 acres of surface disturbance is predicted through the development of locatable minerals. It is unlikely that any salable mineral extraction would occur on BLM-managed lands. All such development would be subject to ROPs, stipulations, and project-specific mitigation measures. Any adverse effects to paleontological resources from mineral development would be unlikely due to the low development potential. By designated all BLM-managed lands as “open” to OHV use, adverse effects could result through damage to surface paleontological resources, especially in heavy use areas, such as the Knik River.

Alternative C – Resource Conservation for Paleontological Resources

Effects to paleontological resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which could reduce any adverse effects to known paleontological resources occurring in high OHV-use areas such as the Knik River SRMA. Effects from forestry (potentially on approximately 20 acres per year), ROWs, mining, and oil and gas developments (2,558 acres of oil and gas potential disturbance, up to 60 acres of locatable potential disturbance), and recreation use would occur on a very localized scale. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Paleontological resources would receive further levels of protection through the development of implementation plans and ROPs, if any are

known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F).

Alternative D – Proposed Action for Paleontological Resources

Effects to paleontological resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, which could reduce any adverse effects to paleontological resources occurring in high OHV-use areas such as the Knik River SRMA. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, effects from forestry (potentially on 20 acres per year), ROWs, mining, and oil and gas developments (2,558 acres of oil and gas potential disturbance, up to 60 acres of locatable potential disturbance), and recreation use would occur on a very localized scale. SRMAs are identified in the Knik River and the Haines Block. An ACEC is identified in the Neacola Mountains. Paleontological resources would receive further levels of protection through the development of implementation plans and ROPs, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F).

4.4.3.8.3 Overall Cumulative Effects on Paleontological Resources

Disturbances to paleontological resources in localized areas have resulted from mining and oil and gas projects, transportation projects, forestry, recreation activities, construction of facilities, and military activities throughout the Ring of Fire planning area. Future development activities associated with transportation projects, mineral exploration, and population growth may have long-term, adverse effects on paleontological resources, depending on the location and magnitude of the activity, and adoption and effectiveness of mitigation measures. Natural events, such as landslides, earthquakes, and floods also have the potential to permanently damage or destroy paleontological resources.

Any direct or indirect effects from mining, oil and gas, road development, or recreation, resulting in surface disturbing activities such as road construction, riverbank and bluff erosion, or trail cutting, would likely be to small acreages, so the likelihood that any known paleontological resources would be adversely affected is low. Effects would be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. As OHV use remains unrestricted or open (Alternatives A and B), adverse effects to paleontological resources could result, especially in heavy use areas, such as the Knik River, although paleontological resources in these areas are not fully known. Alternative B would provide additional guidance and protection through ROPs and stipulations.

However, in Alternatives C and D, the opportunity for additional protection measures for paleontological resources would be provided through limiting OHV use, creating three SMAs, and designating certain areas as closed to mineral development. Given the relatively low level of forestry (approximately 20 acres annually), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands) and recreation use, the contribution to cumulative effects on paleontological resources from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of proposed management actions on a regional scale. Within specific localized areas such as the Knik River, the contribution of high OHV use has a moderate contribution to cumulative effects in the area. Future implementation planning proposed under Alternatives C and D would help to reduce cumulative effects.

4.4.3.9 Cultural Resources

4.4.3.9.1 Past and Present Actions for Cultural Resources

Natural forces have affected the condition of cultural resources; tectonic shifts and post-glacial uplift may have changed the altitude of beaches, putting some former beachfront sites high above current sea level, while sinking other beaches below the current sea level. Physical disturbances or damage to cultural resources have also resulted from mining and oil and gas projects, transportation projects, construction of facilities, and military activities in specific areas throughout the Ring of Fire planning area. The Southcentral region supports the largest human population in the State, and the cultural resources in the larger urban areas have been affected by transportation projects, construction of facilities, and recreation-related activities. Timber harvest and wildland fires have potentially affected cultural resources as well.

4.4.3.9.2 Summary of Direct and Indirect Effects by Alternative for Cultural Resources

Alternative A – Current Management for Cultural Resources

Effects to cultural resources under Alternative A are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less), and the chance that any known cultural resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations. As OHV use remains unrestricted, adverse effects to cultural resources could result through damage to surface archaeological or cultural resources, especially in heavy use areas, such as the Knik River. Adverse effects from forestry and recreation use would likely be limited in extent.

Alternative B – Resource Development for Cultural Resources

Effects to cultural resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. However, an inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. Adverse effects from forestry and recreation use would likely be limited in extent. The disposal or acquisition of lands may adversely or beneficially affect culturally important places. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be limited in extent (2,618 acres or less), so the chance that any known cultural resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations, ROPs and stipulations. As OHV use remains unrestricted, adverse effects to cultural resources could result through damage to surface archaeological or cultural resources, especially in heavy use areas, such as the Knik River.

Alternative C – Resource Conservation for Cultural Resources

Effects to cultural resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which could reduce any adverse effects to cultural resources occurring in high OHV-use areas such as the Knik River SRMA. Effects from forestry, ROWs, mining, and oil and gas developments, and recreation use would occur on a very localized scale, and would be subject to ROPs and stipulations. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Cultural resources would receive further levels of protection through the development of implementation plans, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Visual class designations would be made on all BLM-managed lands, a few of which would be managed under VRM Class II, maintaining the existing visual character around potential cultural resources in these areas.

Alternative D – Proposed Actionfor Cultural Resources

Effects to cultural resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis. BLM would designate all lands as “limited” to OHV use, which could reduce any adverse effects to cultural resources occurring in high OHV-use areas such as the Knik River SRMA. While this alternative would revoke ANCSA 17(d)(1) withdrawals and allow for mineral exploration of additional lands, effects from forestry, ROWs, mining, and mineral disturbance due to mining and oil and gas exploration and development, and recreation use would occur on a very localized scale. Exploration and development activities would be subject to ROPs and stipulations. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Cultural resources would receive further levels of protection through the development of implementation plans, if any are known in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). VRM Class designations would be made on all BLM-managed lands, a few of which would be managed under VRM Class II, maintaining the existing visual character around potential cultural resources in these areas. The remainder of BLM lands would be classified as VRM Class IV, providing less protection for the visual context of cultural resources.

4.4.3.9.3 Overall Cumulative Effects on Cultural Resources

Disturbances to cultural resources in localized areas have resulted from mining and oil and gas exploration and development, transportation projects, forestry, recreation activities, construction of facilities, and military activities throughout the Ring of Fire planning area. Future reasonably foreseeable development activities associated with transportation projects, mineral exploration, and population growth may have long-term, adverse effects on cultural resources, depending on the location and magnitude of the activity, and adoption and effectiveness of mitigation measures. Natural events, such as landslides, earthquakes, and floods also have the potential to permanently damage or destroy cultural resources.

Management actions proposed under Alternative A would maintain the effects to cultural resources at its current levels. Any forestry, mining, oil and gas, road development, or recreation, resulting in surface disturbing activities such as road construction, riverbank and bluff erosion, or trail cutting, would likely be limited in extent; the chance that any known cultural resources would be adversely affected is low. Effects from development operations could also be mitigated through Plans of Operations. As OHV use remains unrestricted, adverse effects to cultural resources could result through damage to surface archaeological or cultural resources, especially in heavy use areas, such as the Knik River. Adverse effects from forestry and recreation use would likely be limited in extent. However, an inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources relative to Section 106 of the NHPA would be conducted prior to any undertaking on a case-by-case basis.

The primary differences between direct and indirect effects of alternatives are the management designations associated with OHV use, and the identification of SMAs (Alternatives C and D) where management of cultural resources present within those areas would be further refined. Alternatives B, C and D provide some additional benefits related to cultural resources through development of ROPs and stipulations, and limitations to OHV use. Alternatives C and D call for future implementation planning in three specific areas, providing additional management guidance.

Given the relatively low level of forestry (approximately 20 acres annually on BLM-managed lands), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands) and recreation use, the contribution to cumulative effects on cultural resources from RFFAs such as climate change, timber sales, transportation, mining, and other recreation activities far outweighs the contribution of proposed BLM management actions on a regional scale. Within specific localized areas such as the Knik River, the contribution of high OHV use has a moderate contribution to cumulative effects in the area. Future implementation planning under Alternatives C and D would help to reduce cumulative effects to cultural resources within the boundaries of the three SMAs.

4.4.4 Cumulative Effects for Resource Uses

4.4.4.1 Lands and Realty

4.4.4.1.1 Past and Present Effects for Lands and Realty

Changes in land tenure have occurred as a result of the Alaska Statehood Act of 1958 (which required that 103,350,000 acres of federal land be conveyed to the State), the Native Allotment Act 1906, ANCSA, Alaska National Interest Lands Conservation Act (ANILCA), FLPMA, and the R&PP Act.

A number of federal laws and actions influenced the current status of land authorizations in the Ring of Fire planning area.

- Section 906(k) of ANILCA: BLM must receive concurrence from the State of Alaska, prior to authorizing uses on lands selected by the State.
- According to 43 CFR §2650.1(a)(2)(i), when land use applications are received that affect lands under application by Native corporations, BLM is required to consult with concerned regions or villages and consider their views.
- The majority of the land base for Elmendorf Air Force Base (EAFB) and Fort Richardson Army Post (FRAP) is public land that is withdrawn and managed by the military for military use EO 8102.

Individual applications for use of BLM-managed lands associated with mining, oil and gas, and transportation projects have resulted in some changes in tenure, primarily leases and ROWs in specific areas.

4.4.4.1.2 Summary of Direct and Indirect Effects by Alternative for Lands and Realty

Alternative A – Current Management for Lands and Realty

Under Alternative A, lands and realty authorizations would continue to occur on a case-by-case basis; no lands would be specifically identified for sale. The continuation of ANCSA 17(d)(1) withdrawals would have a moderate adverse cumulative effect on availability of public land for mineral use, although the potential for reasonably foreseeable mineral and oil and gas disturbance is limited (2,618 acres or less). Access for OHV would remain undesignated for BLM managed lands, and activities within the Knik River area would contribute to adverse effects on habitat, adjacent land use, and public safety.

Alternative B – Resource Development for Lands and Realty

Under Alternative B, four specific small parcels would be offered for sale (Table 2.3-1), and the revocation of ANCSA 17(d)(1) withdrawals could result in an increase in lands and realty authorizations. However, the potential for mineral and oil and gas disturbance is considered low (2,618 acres or less).

All BLM managed lands in the planning area would be designated as open to OHV access, which is effectively similar to Alternative A. All lands within the Ring of Fire planning area would be managed under VRM Class IV, which is the least restrictive classification. No new SMAs would be designated.

Alternative C – Resource Conservation for Lands and Realty

Under Alternative C, no lands would be identified for sale within the planning area, and effects would be similar to Alternative A. Emphasis would be placed on acquisition of land from willing landowners within the proposed Knik River SRMA, the Haines Block SRMA, the Neacola Mountains ACEC, and the Iditarod NHT. ANCSA 17(d)(1) withdrawals would remain under Alternative C; until conveyance of selected land is settled, the amount of unselected lands open to fluid and solid mineral leasing would be reduced compared to Alternative B. In addition, four specific areas on unselected lands and four areas on selected lands would be closed to fluid mineral leasing (Table 2.3-2).

All BLM-managed land in the Ring of Fire planning area would be limited for OHV access to existing and designated trails, consistent with State regulations on *Generally Allowed Uses on State Lands* (Appendix E). Within the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC, limitations would be further refined to meet the objectives of the SMAs (Appendix F). The Neacola ACEC, Halibut Cove Forest Study Area and Lake Carlanna Municipal Watershed would be managed as VRM Class II, and the Knik River SRMA as VRM Class IV. All other BLM lands with the planning area would be managed as VRM Class III. Wildlife values would be further addressed in the development of special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC.

Alternative D – Proposed Action for Lands and Realty

A total of eight small parcels have been identified for sale in the planning area, totalling approximately eight acres (Table 2.3-1). Revocation of ANCSA 17(d)(1) withdrawals could result in an increase in lands and realty authorizations, although specific areas would remain closed to mineral entry. However, the potential for mineral disturbance is considered limited given the small number of acres designated as having high mineral development potential on BLM-managed lands (2,618 acres or less). The Mountain Goat Monitoring and Control Area within the Haines Block SRMA would be identified as an avoidance area for issuance of ROW authorizations. All lands in the Ring of Fire planning area would be designated as limited to existing roads and trails to OHV use, with additional direction to be developed under implementation plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC. The Lake Carlanna Municipal Watershed and Halibut Cove Forest Study Area would be managed as VRM Class II, the Neacola Mountains ACEC would be managed as VRM Class II, and the rest of the planning area would be managed as VRM Class IV. Wildlife values would be further addressed in the development of special management plans for the Knik River SRMA, the Haines Block SRMA, and the Neacola Mountains ACEC.

4.4.4.1.3 Overall Cumulative Effects on Lands and Realty

Under all alternatives, cumulative effects resulting from reasonably foreseeable future lands and realty management actions, mineral exploration/development/production, commercial recreation, and transportation projects would result in some minor site-specific changes to land tenure, land authorizations, and coordination of land use plans and landowners. Depending on funding and project approval, development of the Pebble Mine (within the boundaries of the neighboring Bay RMP/EIS planning area) and transportation projects on the Alaska Peninsula and west side of Cook Inlet could result in additional land tenure adjustments associated with transportation and utility ROWs. Other changes in land tenure are expected to continue at current rates until 2009, or until all selected lands have been settled. Land authorizations would

be expected to increase slightly as population and development increase over the extent of this plan.

The primary differences between direct and indirect effects of alternatives are the designation of VRM classes, management of OHV use, revoking ANCSA 17(d)(1) withdrawals, and identification of SMAs where management of lands and realty actions would be further refined. Alternatives B, C and D provide some direction to lands and realty management through limitations to OHV uses through the implementation of ROPs and stipulations. Alternatives C and D would implement future implementation planning in three specific areas, providing further direction to lands and realty management.

Given the scattered and unconsolidated nature of BLM lands, the relative contribution of activities on these lands to cumulative effects would generally be minimal, with four exceptions. The continuation of ANCSA 17(d)(1) withdrawals would have a minor adverse cumulative effect on availability of public land for mineral entry, although revoking the withdrawals would not substantially increase mineral and oil and gas development due to the limited potential on BLM-managed lands within the planning area (2,618 acres or less of potential disturbance). The nature of OHV activity on BLM-managed lands within the Knik River area contribute to cumulative adverse effects on habitat, adjacent land use, and public safety. Construction of the Pebble Mine may require use of BLM lands for access to a Cook Inlet port site, contributing to adverse cumulative effects from mining and associated transportation, but improving regional transportation access.

In light of the relatively low level of forestry (20 acres annually), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system) on BLM-managed lands within the planning area, the contribution to cumulative effects on land and realty actions of RFFAs such as resolution of land conveyance, timber sales, transportation, oil and gas and mining, and other recreation activities far outweighs the contribution of BLM managed activities on a regional scale. Within specific localized areas such as the Knik River, the contribution of high OHV use on BLM managed lands has a moderate contribution to cumulative effects in the area; special management planning under Alternatives C and D would help reduce cumulative effects.

4.4.4.2 Leasable Minerals

Descriptions of past and present events with respect to leasable minerals in the Ring of Fire planning area are presented in the *Mineral Potential Report* (Appendix G) and are summarized below.

4.4.4.2.1 Past and Present Effects for Leasable Minerals

Descriptions of past and present events with respect to oil and gas, and CBNG in Southcentral region are presented in the *Mineral Potential Report* (Appendix G). Cook Inlet basin has had a history of oil and conventional gas exploration and development dating back to the 1950s. Approximately 270 exploration wells have been drilled, and 26 oil and gas fields discovered in the basin to date. Fifteen fields are currently producing in the onshore portions of Cook Inlet Basin, eight of which have federal mineral interests (Appendix G, Table 2). The State of Alaska continues to hold oil and gas lease sales in Cook Inlet.

There has been much interest in CBNG in the Matanuska-Susitna Valley area in the past decade, driven by gas demand and State leasing incentives. A State test well and several industry exploration wells were drilled in the 1990s. Two pilot tests recently conducted at the Pioneer Unit, although initially promising, were considered not capable of commercial production. Exploration for CBNG continues currently in Susitna Valley.

Land status and the implications of federal and State legislation have had a major effect on areas that have been open to mineral exploration and development, including ANCSA, ANILCA, and State legislation related to CBNG.

4.4.4.2.2 Summary of Direct and Indirect Effects by Alternative for Leasable Minerals

Alternative A – Current Management for Leasable Minerals

Under this alternative, mineral development is unlikely due to low mineral development potential (2,618 acres or less) (Appendix G).

Alternative B – Resource Development for Leasable Minerals

Under this alternative, ANCSA 17(d)(1) withdrawals would be revoked, and some additional lands would be open to mineral exploration. However, mineral development is unlikely due to low mineral development potential (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. VRM Class IV management would be prescribed for all lands, and would have minimal adverse effects to development practices.

Alternative C – Resource Conservation for Leasable Minerals

Under this alternative, mineral development is unlikely due to land status and mineral potential (Appendix G). ANCSA 17(d)(1) withdrawals would be retained, and some small areas would be closed to mineral development (Table 2.3-2). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface

disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. Designation of the Haines Block, Knik River, and Neacola Mountains SMAs could result in additional restrictions on mineral development within those areas. VRM Classes would be recommended for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas, thus making development all the less likely.

Alternative D – Proposed Action for Leasable Minerals

Under this alternative, ANCSA 17(d)(1) withdrawals would be revoked, and some additional lands would be open to mineral exploration. However, mineral development is unlikely due to low mineral development potential (Appendix G). Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). Total surface disturbance within the Ring of Fire planning area for all ownerships of projected short-term oil and gas exploration and development, including CBNG, is 2,558 acres. Designation of the Haines Block, Knik River, and Neacola Mountains SMAs could result in additional restrictions on mineral development within those areas. VRM Classes would be designated for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

4.4.4.2.3 Overall Cumulative Effects on Leasable Minerals

Industry interest in the exploration and development of oil and gas, and CBNG in Cook Inlet Basin is expected to continue over the next 10 to 15 years irrespective of BLM mineral leasing decisions. Most activities would take place on non-BLM lands, given the limited oil and gas development potential for all lands in the region (2,558 acres or less of disturbance). The contribution of proposed management actions to cumulative effects would be greatest under alternatives with greater access to federal mineral estate (Alternatives B and D) due to the revocation of ANCSA 17(d)(1) withdrawals. Future external actions, such as building the Knik Arm Bridge (Section 4.4.2), and general road improvements throughout the basin, are expected to reduce exploration and/or development costs, which may increase overall oil and gas activities. Increased exploration and/or development restrictions as a result from of VRM classifications, and/or designation of three SMAs, would have greater effects under Alternatives C and D. However, mineral potential may not be highest in areas with these restrictions. Therefore, adoption of the management actions as described under each of the alternatives, combined with past and present actions, and RFFAs could have minimal adverse effect on leasable minerals within the Ring of Fire planning area under Alternatives C and D, and any such effects would be on a local scale.

4.4.4.3 Locatable and Salable Minerals

4.4.4.3.1 Past and Present Effects for Locatable and Salable Minerals

Descriptions of past and present events with respect to locatable and salable minerals in the Ring of Fire planning area are presented in the *Mineral Potential Report* (Appendix G, Sections 3.2 and 3.3) and are summarized below.

Locatable Minerals

Alaska Peninsula/Aleutian Chain and Kodiak Regions

Although a number of significant locatable mineral deposits have been identified in the Alaska Peninsula/Aleutian Chain and Kodiak regions of the Ring of Fire planning area, these areas have received relatively little past exploration interest due to their remoteness and inaccessibility. There are no active mining claims in the Aleutian Islands. The Apollo Mine, which produced gold ore in the early 1900s, is the only active State claim in the Alaska Peninsula region. Placer gold claims (State) are located on the western and southern beaches of the Kodiak Islands. There are no federal claims in these regions.

Southcentral Region

The Southcentral region is traversed by several mineralized regions and mining districts which have experienced a history of prospecting and mining. Numerous State and federal claims are located in the Yentna-Petersville area, the northern Talkeetna Mountains, the Hatcher Pass-Willow Creek mining district, the Girdwood-Hope area, and in northwestern Prince William Sound (PWS). These areas have had a history of gold mining from placer and lode deposits since the early 1900s. In addition, chromite was produced in the 1940s and 1950s from a deposit in the southern Kenai Mountains. Currently, gold production continues on a localized scale in the Girdwood area, and mineral exploration is being conducted in the Susitna Valley and Chugach National Forest (CNF).

Southeast Region

A number of mineralized areas in the Southeast region have historically produced gold and other metallic minerals from lode and placer deposits since the late 1800s. Numerous claims are held in the Haines-Klukwan area; the Juneau Gold Belt and Admiralty Island; Chichagof and Baranof Islands; on Woewodski, Zarembo, and Kupreanof Islands in the Stikine area; on Prince of Wales and nearby islands in the Ketchikan Mining District; and on the mainland near Hyder, the Cleveland Peninsula, and Misty Fiords National Monument. The industrial mineral barite was produced from a mine in the Petersburg area since the 1960s. Recent exploration and mapping has been conducted throughout southeast Alaska. Currently, there are mining development activities ongoing at the Greens Creek and Kensington mines in the Juneau-Admiralty area, and placer production from one mine in the Klukwan area of southeast Alaska.

Salable Minerals

Sand and gravel has been, and is currently, an important commodity in Alaska, ranking only behind oil and gas in value to the State's economy. Past production in the Ring of Fire planning area has largely been project driven, with peaks occurring during periods of military construction, discoveries of oil and gas fields in Cook Inlet, and urban growth in the Anchorage

and Matanuska-Susitna Valley area. There are currently 13 private producers of aggregate in the Southcentral region and five in the Southeast region.

Most past production of building stone within the Ring of Fire planning area has been from limestone and marble quarries in the Southeast region, although several stone pits have been documented on Kodiak and in the Southcentral region. Marble production began in the early 1900s and declined after World War II. More recently, limestone quarries have been used to build and maintain gravel logging roads in the region.

4.4.4.3.2 Summary of Direct and Indirect Effects by Alternative for Locatable and Salable Minerals

Alternative A – Current Management for Locatable and Salable Minerals

Existing locatable mineral activities that would continue under Alternative A would slightly reduce overall locatable mineral reserves. Some localized salable mineral activities in areas with no existing extraction sites in the Alaska Peninsula and the Southcentral region (Chignik, Iliamna and Iniskin Bays) would continue to occur.

Alternative B – Resource Development for Locatable and Salable Minerals

Locatable mineral activities would reduce overall locatable mineral reserves in the Ring of Fire planning area, although the amount of mineral development is projected to continue at the relatively low current levels. ANCSA 17(d)(1) withdrawals would be revoked. Salable mineral effects under Alternative B would be the same as Alternative A. VRM Class IV management would be prescribed for all lands, and would have minimal adverse effects to development practices.

Alternative C – Resource Conservation for Locatable and Salable Minerals

Under this alternative, mineral development is unlikely due to land status and mineral potential (Appendix G). ANCSA 17(d)(1) withdrawals would remain in place, continuing to withdraw these lands from mineral entry. Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). VRM Classes would be recommended for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

Alternative D – Proposed Action for Locatable and Salable Minerals

Under this alternative, mineral development is unlikely due to selected land status and low mineral potential (Appendix G). ANCSA 17(d)(1) withdrawals would be revoked. Any permitted or leasing activities would have to comply with guidelines outlined in the stipulations and ROPs (Appendix D). VRM Classes would be designated for certain lands, potentially increasing the level of restrictions placed on mineral exploration and development in these areas.

4.4.4.3.3 Overall Cumulative Effects on Locatable and Salable Minerals

The effects of surface disturbance on BLM-managed lands, which are projected to be balanced all or in part by reclamation, would be compounded by external mineral exploration/ development, transportation, and power projects in the Southcentral and Southeast regions, which would encourage locatable mineral activities region-wide. Effects from these combined

activities would have net adverse cumulative effects on the environment through surface disturbance and reduction of mineral reserves. These effects are expected to be less in extent (by about 100 acres) under Alternatives A and C, than under Alternatives B and D.

Most mineral development would take place on lands other than those managed by BLM, given the low development potential outlined in Appendix G. Effects from salable mineral activities predicted under Alternatives A, B, and D for BLM-managed lands in the Alaska Peninsula and Southcentral regions, would be compounded by external transportation projects and minerals leasing in these regions. These activities may cause adverse cumulative effects through land disturbance and reduction in salable mineral reserves. No salable mineral activities are predicted on BLM-managed lands under Alternative C, or in the Kodiak or Southeast regions under Alternatives A, B, and D. Thus, adverse cumulative effects would be the result of the externally initiated RFFAs alone.

Increased exploration and/or development restrictions as a result of VRM classifications would have greater effects on Alternatives C and D. However, mineral potential may not be highest in areas with these restrictions. Therefore, adoption of the management actions as described under each of the alternatives, combined with past and present actions, and RFFAs may have minimal adverse effect on locatable and salable minerals within the Ring of Fire planning area under Alternatives C and D, although any effects would be on a local scale.

4.4.4.4 Off-Highway Vehicles

4.4.4.4.1 Past and Present Effects for Off-Highway Vehicles

Outside of the Campbell Tract facility, there are no OHV use restrictions or designations on BLM-managed lands within the Ring of Fire planning area. Use levels throughout the State are rising due to an increasing population, a growing interest in outdoor recreational opportunities, rising disposable income for use on recreational pursuits, and advances in vehicle technology. Limitations in areas that are suitable for, or open to OHV use continues to put pressure on relatively accessible and popular OHV destinations within the planning area such as the Knik River Flats. State legislation is currently proposed to maintain State lands within the Knik River area as open to OHV use.

4.4.4.4.2 Summary of Direct and Indirect Effects by Alternative for Off-Highway Vehicles

Alternative A – Current Management for Off-Highway Vehicles

Management proposed under Alternative A would maintain any effects on OHV use at their current levels. There are no OHV designations in place within the Ring of Fire planning area at this time, and use is allowed on all types of terrain. Through the acquisition of lands and easements, more lands may become available for OHV use, though these actions are not common within BLM. Management guidelines or stipulations related to fish and aquatic habitat, wetlands and riparian vegetation, and wildlife may contain limitations on OHV use in certain areas. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative A would have minimal effects on OHV use, and effects would be on a very localized scale.

Alternative B – Resource Development for Off-Highway Vehicles

Effects on OHV use from future management under Alternative B would most likely occur along the existing road network, and would primarily be limited to a small portion of BLM-managed lands. Lands would be designated as “open” to OHV use on all lands within the Ring of Fire planning area. Effects from forestry (less than 20 acres per year), ROWs, mining, and mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres) would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative B would have minimal effects on OHV use, and effects would be on a very localized scale.

Alternative C – Resource Conservation for Off-Highway Vehicles

Effects to OHV use from future management under Alternative C are likely to be minor in scale, or concentrated in specific areas. BLM would designate all lands as “limited” to OHV use, following ADNR’s *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the recreation setting in high OHV-use areas such as the proposed Knik River SRMA. Effects from forestry, ROWs, mining, and oil and gas developments, would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection

through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). All of these actions may have some minor adverse effects on OHV use on BLM-managed lands, relative to the current management actions, by decreasing the amount of lands available for OHV use, or increasing restrictions.

Alternative D – Proposed Action for Off-Highway Vehicles

Effects to OHV use from future management under Alternative D are likely to be limited in scale, and concentrated in specific areas. BLM would designate all lands as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E), which may provide changes in the recreation setting in high OHV-use areas such as the proposed Knik River SRMA. Effects from forestry (approximately 20 acres per year), ROWs, mining, and mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres) would likely be limited in extent; consequently only a small portion of OHV use on BLM-managed lands may be affected. SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Resources would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). SRMA implementation plans for the Knik River could result in areas specifically being designated as open, limited, or closed to OHV use. All of these actions may have adverse effects on OHV use on BLM-managed lands, relative to the current management actions, by decreasing the amount of lands available for OHV use, or increasing restrictions.

4.4.4.4.3 Overall Cumulative Effects on Off-Highway Vehicles

OHV use on BLM lands within the Ring of Fire has been unregulated to date. RFFAs such as the Knik Arm Crossing, the Juneau Access project, timber sales, and mining projects may create additional access to lands through the development of new access points and routes, providing additional lands for recreational OHV use. The RFFAs within the Ring of Fire planning area vary with respect to location, duration, and magnitude, but may all contribute to an overall greater effect on OHV use through development of additional ROWs, access, and designation of areas "open" to OHV use. The management actions proposed under Alternatives A and B would maintain any effects on OHV use at their current levels. Therefore, available information described in Section 4.3.2, combined with past and present actions, and RFFAs, indicate that the adoption of the current management actions as described under Alternatives A and B would have a slightly lower level of restrictive cumulative effects on OHV use within the Ring of Fire planning area, when compared to the closer management of OHV use in the SMAs recommended under Alternatives C and D.

Under Alternatives C and D, the designation of all lands as "limited" to OHV use, would occur. In addition, three SMAs are designated, and subsequent implementation plans developed that would evaluate the environmental consequences of site-specific activities (including OHV use). All of these actions may limit OHV use on BLM-managed lands, relative to the current management actions, by decreasing the amount of lands available for OHV use, or increasing restrictions. The majority of these effects would be localized. Cumulatively, the level of OHV use on all lands within the region would remain the same or increase pending State legislation. Management planning for the Knik River SRMA could allow current levels of use while mitigating adverse effects of OHV use to some degree.

4.4.4.5 Recreation

4.4.4.5.1 Past and Present Effects for Recreation

Unconsolidated land ownership patterns and changing land ownership of parcels have complicated recreation management in the Ring of Fire planning area. There has been a limited level of BLM recreation management in the planning area due to the remote, scattered nature of the land base and land tenure status. In general, recreation resource conditions are highly dependent on the health of harvestable resources (i.e., fish and game) and available facilities and use areas. This relationship revolves around recreation access from the existing road system.

The increased use of helicopters for commercial recreation purposes, and the demand for increased access has prompted the need to examine management techniques such as designating exclusive use areas, establishing Monitoring Control Areas, no-fly zones, and rotating flight patterns. In the Haines/Skagway area, concerns over helicopter use include: effects on mountain goat populations, stress on other wildlife species, and effects on residential populations and other recreation users seeking solitude in areas that also accommodate helicopter-related recreation activities.

The Knik River Valley area is owned and managed by a variety of public and private entities. Both motorized and non-motorized use levels in the area have increased, occasionally leading to user conflicts.

4.4.4.5.2 Summary of Direct and Indirect Effects by Alternative for Recreation

Alternative A – Current Management for Recreation

Management proposed under Alternative A would maintain any effects on recreation at their current levels. Campbell Tract is the only SMA currently identified within the Ring of Fire planning area. Through the acquisition of lands and easements, a small amount of lands may become available for recreation use. Commercial recreation activity is currently limited by permit. Some conflicts between motorized and non-motorized recreation users may occur in the Knik River valley. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative A may have minor effects on recreation.

Alternative B – Resource Development for Recreation

There would be no new SMAs established within the Ring of Fire planning area. Through the acquisition of lands and easements, more lands may become available for recreation use. The revocation of ANCSA 17(d)(1) withdrawals would allow for the leasing of fluid minerals, and for the exploration and development of locatable and salable minerals on certain lands. Stipulations or other permit requirements around mineral exploration and development may have adverse effects on recreation use and access through restrictions in specific locations, and in other cases protect recreation uses and activities. However, given the low mineral development potential on BLM-managed lands (2,618 acres or less of disturbance), effects would be minor. Recreation use may also be restricted in areas where there are conflicts with wildlife management objectives. Some conflicts between non-motorized recreation use and OHV use may occur in the Knik River valley. Available information described in the sections above indicates that the adoption of the management actions as described under Alternative B may

have a minimal adverse effect on recreation use, and would be dispersed throughout the planning area.

Alternative C – Resource Conservation for Recreation

SRMAs are identified in the Knik River and the Haines Block, and an ACEC is identified in the Neacola Mountains. Recreation resources and uses would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Additional mineral leasing restrictions that may, among other things, limit or protect recreation use would be put in place for certain sensitive or unique areas. However, given the low mineral development potential on BLM-managed lands (2,618 acres or less of disturbance), effects would be minor. BLM would designate all lands as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E). While some of these actions may adversely affect recreation, such as increasing restrictions on use or access in certain areas, the majority of the actions proposed under Alternative C would have beneficial effects on recreation use, access, and the preservation of recreation settings relative to current management actions.

Alternative D – Proposed Action for Recreation

SRMAs are identified in the Knik River (Figure 2.3-5) and the Haines Block (Figure 2.3-4), and an ACEC is identified in the Neacola Mountains. Resources, particularly wildlife, would receive further levels of protection through the development of implementation plans in these areas, and would be managed to meet the objectives of the specific SMAs (Appendix F). Additional mineral leasing restrictions that may, among other things, limit or protect recreation use, would be put in place for certain sensitive or unique areas. However, given the low mineral development potential on BLM-managed lands (2,618 acres or less of disturbance), effects would be minor. BLM would designate all lands as "limited" to OHV use, following ADNR's *Generally Allowed Uses on State Lands* (Appendix E). While some of these actions may adversely affect recreation, such as increasing restrictions on use or access in certain areas, the majority of the actions proposed under Alternative D would have beneficial effects on recreation use, access, and the preservation of recreation settings relative to current management actions.

4.4.4.5.3 Overall Cumulative Effects on Recreation

The Campbell Tract is the only SMA designated within the Ring of Fire planning area to date. RFFAs include recreation projects, mineral development, timber harvest, and transportation and utility development projects (see to Section 4.4.2). All of the proposed projects have the potential to change recreation settings, recreation access, and availability of recreation resources. In addition, as the population within the Ring of Fire planning area continues to increase, it is assumed that recreation use would also increase, especially in the Southcentral and Southeast regions. Some of this increase would be on BLM-managed lands. Generally, recreation settings would shift to less primitive recreation classifications with increasing development and motorized access proposals.

The primary differences between direct and indirect effects of alternatives are the designation of VRM Classes, management of OHV use, and designation of SMAs where management of recreation uses would be further refined. Alternatives B, C and D provide some additional protection to recreation resources and activities through development of ROPs and stipulations. Alternatives C and D would limit OHV use, and establish special management planning in three

specific areas. However, compared to the magnitude of RFFAs such as mineral and oil and gas development, and transportation projects, the relative contribution of BLM actions to cumulative effects would be minor. Given the relatively low level of recreation use on BLM-managed lands (unconsolidated parcels with larger blocks located off of the existing road system) within the planning area, the contribution to cumulative effects on recreation use due to the availability of other federal and State lands for recreation far outweighs the contribution of BLM managed activities on a regional scale. Within specific localized areas such as the Knik River and Haines Block, recreation activities on BLM managed lands, in conjunction with activities on other public lands, combines with uses on neighboring lands to create a moderate level of adverse cumulative effects in the area. Special management planning proposed under Alternatives C and D would help reduce the BLM contribution to adverse cumulative effects on recreation resources and uses.

4.4.5 Special Designations

4.4.5.1 Special Management Areas

4.4.5.1.1 Past and Present Effects for Special Management Areas

The Campbell Tract Facility was designated as an SRMA in 1988 and is managed under the Campbell Tract Facility Management Plan. The Iditarod NHT was designated in 1978 and is managed under the Iditarod National Historic Trail Comprehensive Management Plan (BLM 2003b). Only portions of the Iditarod NHT are in the Ring of Fire planning area.

The Neacola Mountains in the Southcentral region of the planning area have undergone evaluations and were found to meet the relevance and importance criteria for an ACEC. The Knik River in the Southcentral region and the Haines Block in the Southeast region were identified as SRMAs because of the recreational uses and wildlife values that occur there. Both ACECs and SRMAs are identified and designated through the PRMP/FEIS planning process.

4.4.5.1.2 Summary of Direct and Indirect Effects by Alternative for Special Management Areas

Alternatives A and B for Special Management Areas

No new SMAs are proposed or designated under Alternatives A and B.

Alternative C – Resource Conservation for Special Management Areas

Under Alternative C, Knik River and Haines Block are managed as SRMAs and the Neacola Mountains is managed as an ACEC. The special recreational values and scenic quality attributes in these areas, prompt SMA designations. Objectives outlined for these three areas can be seen in Appendix F.

Alternative D – Proposed Action for Special Management Areas

Under Alternative D, Knik River and Haines Block are managed as SRMAs and the Neacola Mountains is managed as an ACEC. The special recreational values and scenic quality attributes in these areas, prompt SMA designations. Objectives outlined for these three areas can be seen in Appendix F.

4.4.5.1.3 Overall Cumulative Effects on Special Management Areas

There have not been past effects to the SMAs that are pertinent to the analysis of cumulative effects. RFFAs could contribute to adverse effects to the values associated with the proposed SMAs, unless properly mitigated. If adopted, the SMAs would be protected via permits, implementation plans, ROPs and stipulations, and there would be no adverse cumulative effects anticipated. There is currently a State legislative proposal to establish the Knik River area as a State motorized recreation area. Should this legislation be enacted, BLM would coordinate future SRMA implementation planning with this effort.

4.4.5.2 Wild and Scenic Rivers

4.4.5.2.1 Past and Present Effects for Wild and Scenic Rivers

There are no designated WSRs in the Ring of Fire planning area.

4.4.5.2.2 Summary of Direct and Indirect Effects for Wild and Scenic Rivers

Alternatives A, B, and D for Wild and Scenic Rivers

No river segments would be designated as WSRs under these alternatives.

Alternative C – Resource Conservation for Wild and Scenic Rivers

Effects to any of the eligible river segments for WSR designation under Alternative C are likely to be limited in scale, or concentrated in specific areas. Effects from forestry (approximately 20 acres per year), land conveyance, mining, and disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands) would likely be limited, and may not overlap with river corridors; consequently potential effects would be minimal. OHV use would be designated as limited to existing roads and trails, possibly contributing to a reduction in seasonal adverse effects where they occur in eligible WSR corridors.

4.4.5.2.3 Overall Cumulative Effects on Wild and Scenic Rivers

There are no designated WSRs within the Ring of Fire planning area. There have not been past effects on the rivers identified as eligible for WSR designation under Alternative C that are within the scope of the analysis of cumulative effects. There are several RFFAs proposed for the Ring of Fire planning area that could contribute to adverse effects to the values associated with these eligible WSR segments, unless mitigated. Most applicable RFFAs would increase recreational use around river corridors. Commercial recreation permits, primarily in the Southeast region, have been increasing; activities could alter values associated with certain river segments that have been afforded wild and/or scenic river designations under Alternative C. Given the unresolved land status, it is unclear which eligible river segments will remain under BLM management.

Portions of 14 rivers were identified as eligible for designation as WSRs under Alternative C, but were not determined suitable for designation as WSRs.

The following river segments were identified as eligible for WSR designation:

- **Alaska Peninsula/Aleutian Chain Region:** Barbara and Reindeer creeks (Figure 2.3-6)
- **Kodiak Region:** Elbow Creek (Figure 2.3-6)
- **Southcentral Region:** Eagle River-South Fork, Chilligan River, Iniskin River, Ursus Cove Complex, Kirschner Lake Complex, and McArthur River (Figure 2.3-7)
- **Southeast Region:** Chilkat, Chilkoot, Tsirku, and Tahini rivers, and the Chilkoot Powersite (Figure 2.3-8)

ORVs within these areas would receive some degree of consideration when reviewing proposed actions that might have an effect on ORVs identified for these river segments. No adverse cumulative effects on ORVs within WSR corridors designated as eligible under Alternative C are anticipated

4.4.6 Social and Economic

4.4.6.1 Socioeconomic

4.4.6.1.1 Past and Present Effects for Socioeconomics

A variety of factors have historically influenced socioeconomics in the Ring of Fire planning area, including access, population growth, environmental conditions, military activities, and extractive resource industries. Both population and employment have continued to increase in the project area, with the greatest growth occurring in the MOA and MSB areas. Government revenue has also generally increased, although as revenue from oil and gas development has declined, sales and property taxes have increased.

4.4.6.1.2 Summary of Direct and Indirect Effects by Alternative for Socioeconomics

Alternative A – Current Management for Socioeconomics

Effects to socioeconomic resources from future management under Alternative A are likely to be limited to a very small portion of BLM-managed lands, and would most likely occur along the existing road network. Small areas of forestry (approximately 20 acres per year) or mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM-managed lands) may cause beneficial economic effects on a minimal, localized scale. Beneficial economic effects could also be felt through continued undesignated OHV use, especially in popular recreation areas such as the Knik River Valley.

Alternative B – Resource Development for Socioeconomics

Effects to socioeconomic resources from future management under Alternative B are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per year) or mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres total) may cause beneficial economic effects on a minimal, localized scale. While revocation of ANCSA 17(d)(1) withdrawals could open additional lands to mineral exploration, the amount of additional mineral development is expected to be limited. Beneficial economic effects through local expenditures could also be felt through continued undesignated OHV use, especially in popular recreation areas such as the Knik River.

Alternative C – Resource Conservation for Socioeconomics

Effects to socioeconomic resources from future management under Alternative C are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per year) or mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres total) may cause beneficial economic effects on a minimal, localized scale. Some beneficial economic effects from increased recreation expenditures could also be seen from SMA designations. Minor adverse economic effects from reductions in expenditures could potentially be felt through the limiting of OHV use, especially in popular recreation areas such as the Knik River.

Alternative D – Proposed Action for Socioeconomics

Effects to socioeconomic resources from future management under Alternative D are likely to be limited to a very small portion of BLM-managed lands, and are most likely to occur along the road network. No environmental justice issues would be created as a result of the management actions proposed under this alternative. Small areas of forestry (approximately 20 acres per year) or mineral disturbance due to mining and oil and gas exploration and development (up to 2,618 acres total) may cause beneficial economic effects on a minimal, localized scale. While revocation of ANCSA 17(d)(1) withdrawals could open additional lands to mineral exploration, the amount of additional mineral development is expected to be limited. Beneficial economic effects from additional recreation expenditures could also be seen from SMA designations. Minimal adverse economic effects from reductions in expenditures could potentially be felt through the limiting of OHV use, especially in popular recreation areas such as the Knik River.

4.4.6.1.3 Overall Cumulative Effects on Socioeconomics

The combination of past, present, and RFFAs under all alternatives may continue to affect socioeconomic characteristics of the Ring of Fire planning area. Small areas of forestry or mineral development may cause some increased economic effects through employment and expenditures on a minimal, localized scale. Under Alternatives C and D, increased economic effects through expenditures could result from SMA designations. Minimal adverse economic effects through reductions in expenditures could potentially be felt under these same alternatives through the limiting of OHV use, especially in popular recreation areas such as the Knik River. However, any economic effects resulting from proposed actions would be at a modest scale, extremely hard to detect within the planning area as a whole.

Given the relatively low level of forestry (20 acres annually), mineral disturbance due to mining and oil and gas exploration and development (less than one percent of BLM managed lands), and recreation use (unconsolidated parcels with larger blocks located off of the existing road system) on BLM-managed lands within the planning area, the contribution to cumulative effects on socioeconomic characteristics of RFFAs such as timber sales, transportation, mining, and other recreation activities far outweighs the contribution of BLM managed activities on a regional scale.

4.4.6.2 Subsistence

4.4.6.2.1 Past and Present Effects for Subsistence

Subsistence uses of local resources sustained Alaska Native communities for centuries, with intricate patterns of adaptation to local ecological settings in each Alaska Native culture. Contact history through the Russian, Territorial, and early Statehood eras brought very distinct impacts to different parts of Alaska. However, by the 1960s and 1970s Alaska Natives organized statewide movements to advocate for settlement of their land rights based in aboriginal title and to protect their contemporary reliance on subsistence for economic, social, and cultural purposes. Detailed information on historic trends and contemporary subsistence use patterns for each of the four planning regions is found in Section 3.5.6. This section considers selected broad trends that may affect subsistence uses in the planning region.

While direct management of subsistence harvests on federal lands rests with the Federal Subsistence Board and is not a BLM function, land management activities by the BLM can affect subsistence resources and uses. In addition, as a participating agency in the federal subsistence management program BLM can serve in the role of issue identification through ongoing consultation communities near BLM lands. This includes the potential to learn from the communities of their Local and Traditional Knowledge of these resources to provide insights regarding species' condition, numbers, behavior, and any observed changes to these species. As noted in the discussion of direct and indirect effects, BLM actions have generally limited and localized impacts. This section examines the potential for non BLM initiated RFFAs to have impacts on subsistence activities on BLM-managed lands, including both federally defined subsistence uses on the unencumbered lands and state-defined subsistence uses on the selected lands under BLM management. Many cumulative effects derive not from BLM actions, but from the general course of economic development throughout Alaska. Growth in competition from non-subsistence resource users could reduce access to and availability of subsistence resources on BLM-managed and adjacent lands. For example, the largest block of BLM-managed land in the Southeast region is the State-selected Haines Block, which supports the subsistence uses of several communities and may be subject to pressure from other resource uses.

Reduction in access may be caused by restrictions to OHV and aircraft use and regulation of resource users, although Section 811 of ANILCA protects access for subsistence users, including the use of snowmachines and other means of surface transportation traditionally employed. Increases in competition caused by improved access for resource users could affect subsistence users' ability to provide for their communities' food needs, could have an adverse effect on subsistence traditions for harvests of those species, and could result in a loss of connection to those lands.

Population growth is most acute in the Southcentral region, as suburban development follows the Parks and Glenn highways through formerly rural areas, displacing some subsistence resources and activities, and adversely affecting others by reductions in habitat and increased mortality (e.g., vehicle collision, domestic dog harassment, stream and lake siltation). For the region as a whole, population growth and differences in the financial capacity to purchase and operate highly efficient transportation technologies are contributing to competition for resources and potential displacement of subsistence users. However, the major blocks of BLM-managed land in the Southcentral region are too remote from the communities to be affected. The Knik River parcel of Alaska Native corporation selected land is affected by this trend, and is

encompassed within the southcentral rural community subsistence use areas displayed in Figure 3.5-3 (Appendix A).

4.4.6.2.2 Summary of Direct/Indirect Effects by Alternative for Subsistence

Alternative A – Current Management for Subsistence

The management actions proposed under the various management categories of Alternative A would have a variety of effects on the subsistence use and resources occurring on BLM-managed lands, but effects on subsistence uses would generally continue at current levels. Minimal forestry activity (approximately 20 acres per year) may cause minor, site-specific adverse effects to subsistence, unless appropriately mitigated. Any possible effects from BLM fisheries and wildlife programs, or fire management would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. However, as BLM continues to allow OHV use and other recreational activities to go unrestricted, adverse effects to subsistence users and resources could continue in localized instances. Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative A would have a minimal adverse effect on subsistence resources.

Alternative B – Resource Development for Subsistence

The management actions proposed under the various management categories of Alternative B would maintain the effects to the subsistence use at its current levels (although an increase would be expected with an increase in population). Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to subsistence, unless appropriately mitigated. Any possible effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or associated road development, if it were to occur, would likely be to small acreages (2,618 acres or less), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. Changes to land withdrawal status could have unforeseen effects to subsistence resources, and unrestricted OHV use could cause habitat changes due to overuse of routes, trail braiding, and the deflection of subsistence resources by the motion and noise of OHVs. Available information described in the sections above indicates that the adoption of the current management actions as described under Alternative B would have a minimal adverse effect on subsistence resources.

Alternative C – Resource Conservation for Subsistence

Effects to subsistence resources from future management under Alternative C are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (approximately 20 acres per year) may cause adverse effects to subsistence, unless appropriately mitigated. Any possible effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres total), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to subsistence use and resources. Some management actions,

such as the establishment of SMAs may provide additional protections to subsistence resources and recovery for any previously affected resources, resulting in a beneficial effect. However, where recreational access increases, competition for subsistence resources may also increase. Available information described in the sections above indicates that the adoption of the management actions may result in adverse effects to subsistence use and resources of a lesser extent and magnitude than the current management activities. Some management actions, such as the establishment of SMAs would restrict land use activities and allow for the recovery of previously affected vegetation resources in localized areas, resulting in a beneficial effect. Adverse effects could be highlighted, and subsequently mitigated through close coordination with subsistence users during the implementation planning phase of certain areas.

Alternative D – Proposed Action for Subsistence

Effects to subsistence resources from future management under Alternative D are likely to be limited in scale, or concentrated in specific areas. Minimal forestry activity (less than 20 acres per year) may cause adverse effects to subsistence, unless appropriately mitigated. Any possible effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or road development, if it were to occur, would likely be to small acreages (up to 2,618 acres total), so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. OHV use would be designated as limited to existing roads and trails, contributing to a reduction in seasonal adverse effects to subsistence use and resources. Some management actions, such as the establishment of SMAs may provide additional protections to subsistence resources and recovery for any previously affected resources, resulting in a beneficial effect. However, where recreational access increases, competition for subsistence resources may also increase. Available information described in the sections above indicates that the adoption of the management actions may result in adverse effects to subsistence use and resources of a lesser extent and magnitude than the current management activities. Some management actions, such as the establishment of SMAs would restrict land use activities and allow for the recovery of previously affected vegetation resources in localized areas, resulting in a beneficial effect. Adverse effects could be highlighted, and subsequently mitigated against, through close coordination with subsistence users during the implementation planning phase of certain areas.

4.4.6.2.3 Overall Cumulative Effects on Subsistence

Cumulative effects to subsistence resources and practices are premised upon loss of access, reduced availability, and increased competition for those resources over time. The Southeast and Southcentral regions are most likely to experience adverse effects to subsistence resources and users as part of ongoing development and change in those areas. Areas just outside the Alaska Peninsula/Aleutian Chain region would be subject to changes because of the Pebble Mine and planned transportation infrastructure, primarily on State lands. Future potential exploration and development of minerals, potential hydroelectric and coal fired power system sites, and ongoing residential and recreational land development along roads and waterways of the State will increase the likelihood of ongoing access conflicts. Private landowners may choose to limit access to their lands, reducing the ability of subsistence users to get to their traditional harvesting areas. Federal and State land designations may not allow subsistence users access, or may limit that access to non-motorized subsistence hunter access.

The combination of past, present, reasonably foreseeable effects and effects under all alternatives may continue to adversely affect subsistence use and resources. Any possible

direct or indirect effects from fisheries, fire, or wildlife would be minimal, and would likely not extend to the regional level. Any disturbance from potential mining, oil and gas, or road development, if it were to occur, would likely be to small acreages, so consequently only a small portion of the subsistence resources and use on BLM-managed lands may be affected. Under Alternatives C and D, the limiting of OHV use, and the designations of three SMAs could restrict land use activities and allow for the recovery of previously affected subsistence resources in localized areas, resulting in a beneficial effect. For example, the Haines Block represents an area in which helicopter supported recreation is controversial and has the potential to affect resources of interest to local subsistence users. In the Knik River area, growing OHV use has potential to adversely affect resources. The special management area provisions would be important in managing these potential effects. Any adverse effects could be highlighted, and subsequently mitigated against, through close coordination with subsistence users during the implementation -planning phase of certain areas. The relative contribution of BLM management actions to overall effects would be minor. RFFAs such as mineral and oil and gas development, transportation projects, and competition for resources from an increasing population, may have an overall adverse effect on subsistence resources and uses on the BLM-managed and adjacent lands within the Ring of Fire planning area. However, given the generally limited and dispersed location of BLM-managed lands, cumulative effects would be minimal and would most likely not extend to the regional scale.

4.5 Irreversible and Irretrievable Commitment of Resources

CEQ guidelines (40 CFR 1502.16) require an analysis of irreversible and irretrievable commitment of resources. An irreversible commitment of resources generally applies to non-renewable resources, such as minerals or cultural resources, and constitutes the loss of future production options. It also applies to those factors that are renewable only over long time spans, such as oil productivity. Irretrievable commitment of resources constitutes the loss of opportunities to realize resource potential during the period of the proposed action. This may include the loss of production, harvest, or use of other renewable resources. These decisions may be reversible, but the utilization opportunities foregone are irretrievable.

4.5.1 Resources

4.5.1.1 Physiography, Geology, and Geomorphology

Rather than evaluate the effects of the alternatives on the geologic and geomorphic features of the Ring of Fire planning area, this section evaluates the effects of natural geologic events (e.g., landslides, volcanoes, avalanches, etc.) on the man-made and biological environment. Therefore an evaluation of the irreversible and irretrievable commitment of these resources is not applicable.

4.5.1.2 Soils

Activities occurring within the Ring of Fire planning area under all alternatives may affect soils through compaction, change in aggregate stability, and loss of organic matter. The direct, indirect, and cumulative effects analyses under all alternatives identified mining, recreation, OHV use, and forestry as activities that may adversely affect soil resources, and which may also have irreversible and irretrievable effects.

4.5.1.3 Wetlands and Riparian Areas

Wetland and riparian areas may be adversely affected by a number of development projects and other activities considered in the cumulative effects analyses. Because wetland and riparian habitats are often more sensitive to change relative to upland vegetation, rehabilitation takes longer and is more costly. Wetland and riparian areas provide important functions and values for the ecosystem, and often provide unique habitats in a region. Thus, the activities that may occur in the Ring of Fire planning area under all alternatives may have localized irreversible and irretrievable effects on the wetlands and riparian resources, although regional loss of wetland and riparian habitats is not expected to be substantial.

4.5.1.4 Visual Resources

Activities analyzed in the direct, indirect, and cumulative effects analyses may affect the visual resources found throughout the Ring of Fire planning area under all alternatives through a change in the existing landscape character and/or change in access to important viewpoints. The following activities may affect these visual resources: community, military, commercial and industrial developments, military activities, mining activities, development of marine and transportation facilities, OHV use, timber harvests, and construction of access roads and utility corridors. These actions may adversely affect the visual resources, and in some cases, these effects may be irreversible and irretrievable.

4.5.1.5 Cultural Resources

Development activities, such as mining, construction of access roads and utility corridor, and other ground-disturbing activities have the potential to adversely affect cultural and historical resources. Displacement of archaeological resources could affect the cultural and scientific value of the resource. Adverse effects to known and unknown cultural and historical materials have a greater likelihood to accumulate if use, and development of an area occurs and that use increases in duration, extent, and intensity over time. An inventory of cultural resources, identification of effects, and mitigation of effects on cultural resources under current federal and State regulations would be conducted prior to any proposed action in an effort to avoid any irreversible or irretrievable effects to this resource.

4.5.1.6 Paleontological Resources

Development activities, such as mining, construction of access roads and utility corridor, and other ground-disturbing activities have the potential to adversely affect paleontological resources. Displacement of paleontological resources could affect the cultural and scientific value of the resource. Adverse effects to known and unknown paleontological materials have a greater likelihood to accumulate if use, and development of an area occurs and that use increases in duration, extent, and intensity over time. An inventory of paleontological resources, identification of effects, and mitigation of effects on paleontological resources under current federal and State regulations would be conducted prior to any proposed action in an effort to avoid irreversible and irretrievable effects to this resource.

4.5.2 Resource Uses

4.5.2.1 Lands and Realty

Under Alternatives C and D, IAPs developed for SMAs may preclude certain activities, which may irretrievably commit certain resources. Whether or not the commitment of these resources is irreversible is dependent upon the amount of time lands are designated as SMAs.

4.5.2.2 Leasable Minerals

Alternatives A – Although BLM-managed lands currently closed to leasing would remain closed under Alternative A, lands that are currently leased would continue to be used for oil and gas production. The effects from these activities are irreversible and irretrievable in that the continued production gradually reduces the remaining oil and gas reserves on BLM-managed and adjacent lands.

Alternative C – Under Alternative C, 241,000 acres of unselected lands would become available for mineral leasing, in addition to lands that are currently leased that would continue to be used for oil and gas production. The effects from these activities are irreversible and irretrievable in that the continued production gradually reduces the remaining oil and gas reserves on BLM-managed and adjacent lands.

Alternatives B and D – BLM would recommend the revocation of ANCSA 17(d)(1) withdrawals and allow mineral leasing on lands retained in federal ownership under Alternatives B and D. New oil, gas, and CBNG development under this alternative, combined with continued

operations on existing fields, would cause an irreversible and irretrievable reduction in remaining reserves on BLM-managed and adjacent lands.

4.5.2.3 Locatable Minerals

Alternatives A and C – Some lands would be made available for locatable mineral entry under Alternative A and C. However, new developments would be minimal. The effects of ongoing mining activities in the Southcentral and Southeast regions on BLM-managed and adjacent lands would gradually decrease the remaining mineral reserves, and cause an irreversible and irretrievable commitment of those resources.

Alternatives B and D – The revocation of ANCSA 17(d)(1) withdrawals to allow for locatable mineral leasing would cause minimal irreversible or irretrievable commitments of the locatable mineral reserves on BLM-managed and adjacent lands in the Alaska Peninsula/Aleutian Chain, Southcentral and Southeast regions.

4.5.2.4 Salable Minerals

BLM-administered surface and split-estate lands are currently available for exploration and development of salable minerals. Future demands for aggregate and road construction maintenance may increase the demands on salable minerals located on BLM-managed lands through development of new extraction sites. This would cause an irreversible and irretrievable commitment of salable mineral resources on BLM-managed and adjacent lands in the Alaska Peninsula/Aleutian Chain and Southcentral regions.

4.5.2.5 Recreation

Recreation patterns on BLM-managed lands may be beneficially or adversely affected by the management actions proposed and by activities considered during the cumulative effects analysis. The removal of lands from the public domain, restrictions associated with mineral developments, and limitations establishments in IAPs may irreversibly and irretrievably commit those lands to other non-recreational uses. Other activities considered during the cumulative effects analysis that may adversely affect recreation patterns include mining, transportation projects, timber harvests, and other development. Upon completion of such projects, land may again be available to the public domain. However, because these activities would likely extend beyond the next 10 to 15 years, such activities are considered to have an irreversible and irretrievable affect on the recreation patterns within the Ring of Fire planning area.

4.5.3 Social and Economic Environment

4.5.3.1 Socioeconomics

Economic productivity could be stimulated in the planning area via extractive and/or non-extractive industries that are promoted under Alternatives B and D. Consequently, an increase in economic activity could stimulate population changes in the planning area. This increase in population could either enhance the social environment or increase social pressures. This may result in either beneficial or adverse irreversible and irretrievable effects on the social and economic human environment within the Ring of Fire planning area.

4.5.3.2 Subsistence

Activities considered in the direct, indirect, and cumulative effects analyses that may reduce the quality or affect the users ability to conduct subsistence activities on BLM-managed and adjacent lands include mining, timber harvests, transportation projects, access roads, utility corridors, and recreation activities. Some of these actions would irreversibly and irretrievably reduce the suitability or completely remove the ability of users to harvest subsistence resources.

4.6 Relationship Between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

This section discusses the short-term effects under the Proposed Action (Alternative D) of potential management and use of BLM-managed lands in the Ring of Fire planning area with regard to the maintenance and enhancement of potential long-term productivity of environmental resources on BLM-managed lands. Short-term refers to the total duration of resource use and associated activities, whereas long-term refers to an indefinite period beyond the termination of such uses and activities. The primary resource management actions, uses, and activities authorized by this PRMP/FEIS that will result in local short term uses include:

- Land and realty actions – sale of small specific parcels and revocation of ANCSA 17(d)(1) withdrawals;
- Potential for development of leasable, locatable, and salable minerals – based on mineral development potential, and revocation of ANCSA 17(d)(1) withdrawals that open additional lands to mineral entry;
- Designation of lands as “limited” to OHV use – additional guidance will be provided in specific areas through the completion of implementation-level plans;
- Commercial recreation – management of commercial recreation activities, particularly helicopter landings, with additional guidance to be provided in specific areas through the completion of implementation-level plans; and
- Designation of SMAs – designation and development of subsequent implementation-level plans for two SRMAs (Haines Block and Knik River) and an ACEC (Neacola Mountains).

4.6.1 Resources

BLM-managed resources affected by the Ring of Fire PRMP/FEIS include air, soils, water resources, fish and aquatic habitat, wildlife, vegetation, wetlands-riparian, visual resources, paleontological resources, and cultural resources. Short-term uses of BLM-managed resources associated with the sale of small parcels of land, none of which are important for other resources values, would result in a small acreage of land leaving federal ownership, and would have a minor effect on long-term productivity. Revocation of ANCSA 17(d)(1) withdrawals, potential development of leasable, locatable, and salable minerals, and designation of lands as “limited” to OHV use would result in some minor degradation or resource loss of air quality, water resources, fish and aquatic habitat, wildlife, vegetation, wetlands-riparian, visual resources, paleontological resources, and/or cultural resources. However, the relatively small acreages of disturbance from potential mineral development (approximately 2,618 acres, or less than one percent of BLM-managed lands), and limitations placed OHV use would have a minor effect on long-term productivity of BLM-managed lands in the planning area. Designation and development of subsequent implementation-level plans for two SRMAs (Haines Block and Knik River) and an ACEC (Neacola Mountains) would evaluate measures to reduce potential adverse effects on long-term productivity resulting from the “limited” OHV use designation and commercial recreation.

4.6.2 Resource Uses

BLM-managed resources uses and programs include lands and realty, leasable minerals, locatable and salable minerals, OHV, and recreation. Management uses and activities would result in the sale of several small parcels of BLM-managed lands, and some long-term reduction mineral resources, although the amount of lands affected by sale and development are less than one percent of BLM-managed lands in the planning area. OHV limitations and the designation and development of subsequent implementation plans for two SRMAs (Haines Block and Knik River) and an ACEC (Neacola Mountains) would evaluate measures to reduce potential adverse effects on long-term productivity on recreations uses.

4.6.3 Social and Economic Environment

Socioeconomic and subsistence characteristics and activities would potentially be affected by resource management actions, uses, and activities authorized by this PRMP/FEIS. Sale of lands, resource development, and commercial recreation activities would result in some short-term gains in employment and income in the planning area, and could generate revenue to local government. Effects on long-term productivity would be minor, given the relatively limited amount of potential mineral development on BLM managed-lands.

In the short term, some minor redistribution, reduction, or displacement of subsistence species and activities could occur. Given the relatively small area with potential for disturbance from mineral development, and that the proximity of potential resource development to subsistence use areas is generally distant, potential effects on long-term productivity would be minor.

4.7 Unavoidable Adverse Effects

Unavoidable adverse effects are those direct effects “that cannot be avoided” through project redesign, mitigation measures, or the selection of an environmentally superior alternative, or effects that remain following the implementation of mitigation measures (40 CFR 1502.16). Some unavoidable adverse effects occur as a result of the proposed management under one or more of the alternatives, while others result from public use of BLM-managed lands within the Ring of Fire planning area. While these activities that occur on BLM-managed lands may adversely affect the physical, biological, and/or social environment, the effects of site-specific activities would be assessed in future implementation plans. Table 4.7-1 identifies the unavoidable adverse effects by resource category.

Table 4.7-1. Unavoidable Adverse Effects

Resource	Unavoidable Adverse Effect(s)
Resources	
Air Resources	Mining, OHV use, recreation activities, forestry, and other development activities managed under lands and realty may adversely affect air resources by increasing pollutant levels in the atmosphere. The effects of site-specific activities would be evaluated in implementation plans in an effort to minimize unavoidable adverse effects.
Soils	Recreation and OHV use, timber harvests, mining, and other development activities may adversely affect soils by causing soil compaction, increased soil erosion, and loss of topsoil and organics.
Water Resources	Mining, OHV use, recreation activities, forestry, and other development activities managed under lands and realty may adversely affect water resources. The effects of site-specific activities would be evaluated in implementation plans in an effort to avoid unavoidable adverse effects.
Fisheries and Aquatic Habitat	Activities that may occur under the management actions outlined under the proposed alternatives may have unavoidable adverse effects; however the effects of site-specific activities would be evaluated in implementation plans.
Wildlife and Wildlife Habitat	Activities that may occur under the management actions outlined under the proposed alternatives may have unavoidable adverse effects; however the effects of site-specific activities would be evaluated in implementation plans.
Special Status Species	Due to the regulations and protective measures in place to avoid adverse effects on threatened, endangered, and sensitive species, it is unlikely that any unavoidable effects would occur in association with the proposed alternatives. The effects of site-specific activities would be evaluated in implementation plans.
Vegetation	Activities that may occur under the management actions outlined under the proposed alternatives may have unavoidable adverse effects; however the effects of site-specific activities would be evaluated in implementation plans.
Wetlands-Riparian	Activities that may occur under the management actions outlined under the proposed alternatives may have unavoidable adverse effects; however the effects of site-specific activities would be evaluated in implementation plans.
Visual	Activities that may occur under the management actions outlined under the proposed alternatives may have unavoidable adverse effects; however the effects of site-specific activities would be evaluated in implementation plans.
Paleontological Resources	Mining, forestry, OHV use, recreation activities and other development may cause physical damage to the cultural and scientific value of paleontological resources.
Cultural Resources	Mining, forestry, OHV use, recreation activities and other development may have adverse effects on the NHRP eligibility of cultural resources, and/or may cause physical damage to such resources.
Resource Uses	
Lands and Realty	Under Alternatives C and D, should unselected BLM lands be designated as SMAs, including WSRs and T&E critical habitat, such lands would be required to remain in federal ownership. IAPs for SMAs may also preclude certain activities and could create a conflict between land users.
Leasable, Locatable, and Salable Minerals	The proposed alternatives range from no allowable mineral exploration, development, or production; to the opening of all BLM-lands to mineral leasing. Continued mineral exploration and production will constitute an unavoidable adverse effect on remaining mineral reserves. The effects of mining on the physical, biological, and social environment are discussed under the appropriate resources.
Off-Highway Vehicles	Establishment of SMAs with OHV stipulations, and OHV limitations may have perceived adverse effects on OHV use as currently enjoyed. Mining, forestry, and other development activities may also have adverse affects on recreation access and availability and the quality of the recreational experience.
Recreation	Establishment of SMAs with recreation stipulations may have unavoidable adverse effects on the recreation patterns within the Ring of Fire planning area. Mining, forestry, and other development activities may also have adverse affects on recreation access and availability and the quality of the recreational experience.

Table 4.7-1 (continued). Unavoidable Adverse Effects

Resource	Unavoidable Adverse Effect(s)
Social and Economic Environment	
Socioeconomics	An increase in renewable and non-renewable resource extraction may beneficially affect the economy, and may stimulate population growth in the Ring of Fire planning area. However, whether an increase in population would have a beneficial or adverse affect on the social settings is uncertain.
Subsistence	Mineral development, forestry, and other development activities may have unavoidable adverse effects on subsistence access, harvest availability, and harvest quality.

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